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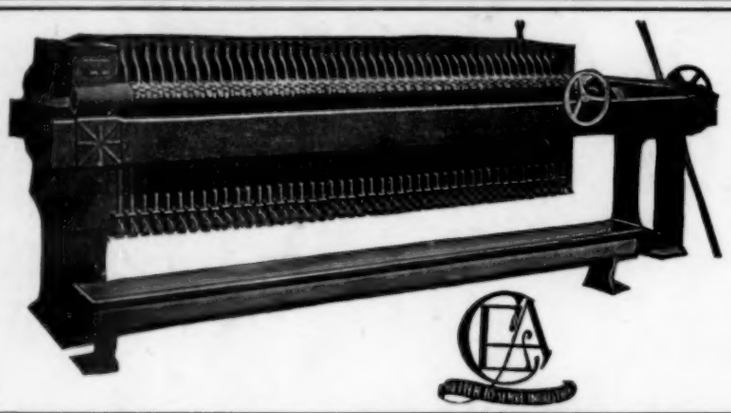

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H. C. PARMELEE, Editor

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High Cost Of Smoke

EVERY once in a while there comes to our desk a friendly little pamphlet called *Business Chemistry*. Its life purpose, so it professes, is "to turn the light of modern chemistry on the problems of Business and the profits hidden in the waste-pile of Industry and latent in its processes and byproducts." Just now its cheerful rays are turned on the dark and dreary subject of smoke—the thick, smoky kind that made Pittsburgh famous.

A very conservative and reputable friend of ours is quoted as saying that each year every man, woman and child residing in Pittsburgh contributes $20 toward the support of the dismal cloud that hangs over and around the steel city. This outlay comprises several factors in addition to the actual loss of fuel, for to the individual the greater hazard to health, the depressing psychological effect and the increased laundry bills are very real and serious burdens.

Before going further we want to make it clear that we hold no grudge against Pittsburgh—for certainly many others of our great industrial cities are suffering from this same dark blight. The important point is that here is a dollars-and-cents evaluation of a problem so stupendous that its significance is likely to escape us. It is a problem based on a simple chemical reaction—one in which the chemist is able to control and predict the end products. What he can accomplish in his laboratory, the engineer must do for industry. He must solve the problem of efficient combustion, not alone to prevent the waste of fuel, but in order to rid our cities of a smoke nuisance that adds so tremendously to the burdens of society.

A Permanent Basis for Our Foreign Commerce Service

WITH us you have no doubt marveled at the progress made by the Department of Commerce in pushing the cause of American business at home and abroad. Under Mr. Hoover's skillful guidance an efficient foreign service has been organized, and from this source has come a continuous stream of commercial information that has been of great practical value in developing an American export trade. This progress has come in spite of the fact that the archaic statutes governing such activities permitted only a temporary, and therefore very unsatisfactory, organization.

If the effort is to be most helpful, it must be continuous. It must have stability. If the men who make up the service are to carry through their plans for organized service to American exporters, they must be assured of support from year to year. Their positions must not be dependent upon the political maneuvers in Washington that determine annual budgets and appropriations. And finally, all of the economic investigations and the trade promotion and commercial activities of the government, whether carried on by the Consular Service of the State Department or the Bureau of Foreign and Domestic Commerce of the Department of Commerce, must be correlated under a single direction if they are to be most effective.

These are the more important objectives that are sought in H.R. 4517, the bill introduced by Congressman Winslow "to establish in the Bureau of Foreign and Domestic Commerce of the Department of Commerce a Foreign Commerce Service of the United States."

On Feb. 6, the Committee on Interstate and Foreign Commerce will hold hearings to discuss the merits of this proposal. It is important that our industries, which have profited so materially from the foreign service of the Department of Commerce, should give their support to a measure that will insure the permanence of this effort.

A Message To the South

FOR years the words "Muscle Shoals" have embodied the dreams and aspirations of the Southern states for the development of one of the greatest water powers in this country. On several occasions before the war efforts were made to induce Congress to authorize the construction of dams and locks for the development of hydro-electric power and navigation on the Tennessee River. Successively these efforts failed and it was not until the emergency of war made it necessary to locate munition plants that the Muscle Shoals power project was authorized. But at the close of the war and for several years thereafter the entire project—chemical and power—was as useless to the South as though it had never been built.

Then in 1921, the year of greatest business depression since the war, Mr. Ford offered to buy the nitrate plants and lease the power project. It is not surprising that the South hailed him as a benefactor and supported his plan with all of the vigor and enthusiasm that are so characteristic of all Southern people. Duly impressed by Mr. Ford's industrial successes, and with a vision of a huge industrial center at Muscle Shoals, Southerners with one accord urged acceptance of the Ford offer. It stood alone for nearly 3 years, during which time it was the subject of attack and opposition. But while it made no progress on its own account, it catalyzed the activity of other bidders and gave the United States a variety of offers from which to choose.

The hearings before the Military Affairs Committee of the House during the past few weeks have demonstrated the vitality of the Ford offer and the magic of his name. But there was an evident turn in the tide of opinion as the successive offers of other bidders were

published. The relative value to the South of concentrating the use of Muscle Shoals power in one place as against its distribution among established power companies through the Southern states was presented for the first time. Likewise an opportunity was afforded to compare the net financial return to the United States under the different plans, as well as the assurance of fertilizer manufacture throughout the full period of the lease.

The South is now in a better position than ever before to realize its dreams and ambitions for Muscle Shoals, but it also is confronted with the necessity of passing calm judgment on the merits of several plans instead of being swayed by the alluring prospect of a single proposal. It is not for us to advise the South at this time, but it is within our province to point out the necessity of giving due thought to the whole problem. For the South Muscle Shoals is no longer a question of Ford or anti-Ford. It has become much larger than that and demands careful study and consideration. Stripped of its technicalities on which technical advice must be sought by the government, there still remain the larger aspects of general welfare to the South on which the people are quite competent to pass. It is a time to abandon prejudice, passion and blind favoritism, and determine what is best. The South should look before it leaps, think before it speaks.

Foreign Combination Against American Dye Industry

IN SPITE of recent reports no accord has yet been consummated between the British and German manufacturers of dyes, according to cables reaching Washington from Great Britain. It is evident, however, from a statement made by Sir William Alexander on Jan. 25, that negotiations looking toward an Anglo-German agreement had then reached an advanced stage. The plan is supposed to involve a home monopoly for the British manufacturers, at least as far as German competition is concerned, while the overseas markets will be divided under an agreement for territorial allocation and percentage sharing in all business done by the two countries.

It is believed in Washington that there is still no assurance that the plan will be consummated. Possibly the negotiations had their rise in the financial troubles of the British corporation, but a new and urgent need for the understanding is believed to lie in the results of last month's elections in Great Britain, in which the defeat of the protectionists is regarded as forecasting the revision of dye control.

The negotiations have a serious import for American chemical industry. If the British and the Germans get together, it will leave the United States to fight alone against the combined resources of the remainder of the world. Germany already has accords with France, and German influence long since has been predominant in Italy. The Swiss are dependent upon Germany for crudes. Hence it means more than a desperate fight to retain our foreign trade in dyes. A combination such as seems about to be effected is in a position to become a powerful competitor in the domestic market. Under the provisions of our tariff act, the duty on coal-tar products will be reduced on Sept. 22 from 60 per cent to 45 per cent ad valorem, a 25 per cent decrease in the ad valorem rate. On all finished coal-tar products the act reduces the rate from 55 per cent to 40 per cent. In addition to the competition that can be offered by what amounts to a world-wide combination against the American industry is the increasing volume of reparation dyes reaching this country. Ten per cent of all dyes imported during 1923 came from Italy, and 95 per cent of those dyes was of German origin.

A British-German combination not only will bring powerful competition to our dye industry but it will strengthen the very important competition that comes to the heavy chemical industry from British producers. It is known that the British industry very much preferred a plan of co-operation with the American dye manufacturers, but apparently this did not appeal to the American industry, or it may have been found impossible to secure the necessary unity of action among the diverse interests that constitute our industry. We have confidence that the American dye industry will meet this competition successfully, even though it will tax our technical skill and business ingenuity.

What of the Future of The Trade Association?

THERE are those who see in the recent decisions against the trade association a sort of naval disarmament treaty that means the junking of much of the modern equipment of organized business. There is a tendency to read into these opinions a broad indictment against all statistical service. And it is only natural that certain organizations should discontinue their co-operative work, preferring to return to the dark days of guesswork and speculation rather than to incur the possible wrath of governmental authorities. Many reasons occur to us for believing this a most short-sighted policy.

In the first place, in all of the cases that so far have come up for review by the courts there have been compromising circumstances that have prevented judgment solely on the right of an association to collect and distribute the general statistics of an industry. These activities have been used only as a cloak to hide nefarious practices of price fixing, territorial division and other restraints to competition. Nothing would clarify the present situation so much as a court ruling on a clear-cut case of an association gathering the essential statistics of an industry and generally distributing them in the form of unidentified totals and averages.

Another consideration, to which we have already directed attention in these columns, is the fact that the subjects of most of the present apprehension are the consent decrees in the cases against the Gypsum Industries Association and the Tile Manufacturers' Credit Association. We should not lose sight of the fact that the consent decree establishes no legal precedent other than portraying the government's attitude at that particular time toward a particular set of circumstances. The only real significance of the Tile Manufacturers case is that it shows definitely for the first time the menacing policy that apparently has been adopted by the Department of Justice. Just what will be the consequences of this policy remains to be seen.

If it could find support in the courts in its entirety, it would ultimately mean the suppression of all statistical service. It would mean business chaos in which the small manufacturer or dealer would suffer more acutely than the larger and richer enterprises that can afford to maintain their own means of obtaining the information desired. This is exactly the converse of the purpose for which the Sherman and Clayton acts were designed. The original debates in Congress re-

veal no mention of the trade association, for at that time, it will be recalled, the legislative guns were trained on the great consolidations of capital, the trusts of infamous reputation. These were adjudged combinations against the public welfare, a charge that could be supported against only a very small minority of trade associations. The fact that association activities are subject to control under an act designed for other purposes is in itself testimony for the need of new legislation or for proper amendments to existing statutes.

Professor Oliphant of the School of Law, Columbia University, who has consented to discuss the legal aspects of the trade association question, has given us on the whole a distinctly encouraging view. In the hypothetical case which he outlines on page 191 (and the circumstances he assumes there are no different from those affecting the co-operative statistical work of legitimate trade associations in the chemical engineering industries) he is of the opinion that there is no violation of the Sherman act, provided, of course, the arrangement is carried out honestly and prudently, with no attempt, however subtle, to divide sales territory, to establish fixed price levels or otherwise to restrain the normal course of competition. And after all these are the fundamental principles that should govern all business endeavor.

Pliable Cast Iron

IT SOUNDS remarkable, doesn't it? And yet why should we not expect to anneal cast iron effectively and quickly as we anneal steel? Mainly for the reason that we have been taught that it cannot be done! But as in many such instances, someone with initiative and little respect for tradition has accomplished the apparently impossible. Alexander K. Schaap of Brooklyn, who evidently has an eye for distinguishing real facts from mere statements, has proved to himself and the rest of the world that it can be done.

According to disclosures made in our contemporary *Iron Age*, cast iron, gray or white, is heated throughout its cross-section to 1,600 deg. F., which requires perhaps half an hour. The casting is cooled rather slowly to a black heat and then with convenient rapidity to room temperature. But there is one precaution that must be observed. During the heating and the period of slow cooling the piece is protected by a wrought-iron muffle. Protected from what? That we do not yet know, except that in all probability it is a gas. If a porous refractory is used for the muffle, the cast iron will not be annealed to the desired pliable resilient state. If there is a crack in the wrought-iron muffle, there will be a hard spot in the casting opposite this fracture. Apparently, then, the embrittling agency is a gas, and a light one, for the top of the muffle need not be tightly closed. Possibly it is hydrogen, but that has not yet been determined with any certainty.

Many serious attempts to anneal cast iron have been made in the past few decades. They invariably resulted in a loss of strength of 50 to 80 per cent. In 1918 an eminent authority on cast iron said that annealing "inevitably leads to the weakening of such material." It was taken for granted that the structure of the cast iron was affected by the annealing heat-treatment so as to produce this effect. It is pathetic to notice, now that it seems so simple, that it was not even dreamed that the weakness might be the result of an agency that could be eliminated. Cast-iron strips annealed by the Schaap process can be bent back and forth, cold, several times before breaking. Hot, they can be tied in knots! And yet only a short time ago they said it could not be done.

The True Merit Of Imitations

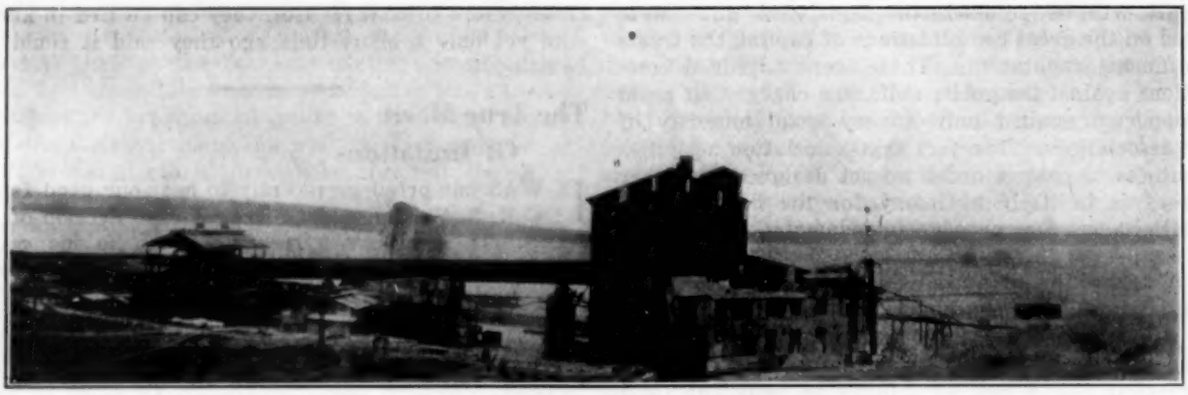
IT WAS our privilege recently to hear our good friend Dr. E. E. Slosson address the Chicago Section of the A.C.S. It is always a treat to listen to his genial comments and his good-natured constructive sarcasm, for consciously or unconsciously Dr. Slosson hits at the foibles and weaknesses of the technical man and by giving them proper perspective always leaves one with a saner, healthier point of view. He told of his original decision to study chemistry—such a nice comfortable science with no bothersome mathematics or other thorns in the side, and of his gradual disillusionment when disconcerting integration signs began to appear. Finally he decided to abandon it for journalism, a field of endeavor in which mathematics seldom intrudes. He told his mentor, Dr. Stieglitz, of his decision, who said, "Well, you have at least had some contact with truth, however little you may find use for it in the future."

Then Dr. Slosson gave a delightful kaleidoscope of anecdotes that showed how science and technology have progressed only by a series of imitations of natural or existing products. The glass beads in Tut-ankh-Amen's tomb were much more wonderful than the jewels they imitated, yet they had to be introduced as imitations. The alchemists probably knew that the philosopher's stone and the elixir of life were impossible, yet they could hardly have interested their greedy patrons in the idea of scientific investigation which in 2,000 years might lead to the electric motor and the flying machine. Even in recent times isinglass was discovered and called glass, although it wasn't, because there was no name that could readily be understood by the buying public. Then mica was discovered, much superior to isinglass, but it was called that for years. Finally cellulose compounds have displaced mica for certain purposes, but they are still referred to as mica. In like manner every manufacturer of nut margarines is required by law to label his product oleomargarine, although there is not the slightest trace of oleo compounds of them. The recognition and success of novelties is handicapped by the similarity to other products of which they are supposed to be imitations.

Anonymous Contributions

ALTHOUGH it is understood among editors and authors that anonymous contributions cannot be considered for publication, it is occasionally necessary to emphasize the point and bring it to the attention of the writing public. Editors are not wholly averse to withholding the name of a contributor who wishes to discuss a particular question, and frequently a contribution of this kind is published under a *nom de plume*. It is essential, however, even when this courtesy is extended that the identity of the writer be known to the editor.

The occasion of this note is the recent receipt of an unidentified contribution from "A Chemical Engineer" discussing a recent editorial utterance in *Chem. & Met.* Under the circumstances we cannot pass the letter on to our readers, but if the author will identify himself we shall consider its publication.



A Competitor of American Soda

The Remarkable Deposit of Lake Magadi Has Attained Technical and Financial Vitality

HEAVY chemicals for the world from Africa is a phrase that has certain elements of humor about it. Certainly Africa is the last place that we would look to instinctively for heavy chemicals. And yet a source of soda has been developed there that possesses great potential strength as a factor in world commerce. Already Japan consumes large quantities of material from this source, while Sweden, Norway, Belgium and England have all received shipments.

American Consul W. L. Jenkins at Nairobi has sent an interesting report on the lake to the Department of Commerce. It is situated 100 miles southwest of Magadi Junction, a station on the Uganda Railway, British East Africa. It has a surface of about 34 square miles and over the entire surface of the lake is a crust of bicarbonate and carbonate of soda. This crust is very dense in texture and so hard that automobiles can be driven over it. The thickness of the crust varies at different points on the surface, but nowhere is the thickness less than 3 feet.

Looking out over it, the lake has the appearance of frozen snow and gives the characteristic crunch of hard frozen snow when it is stepped on. As a fitting background to this impressive spectacle the steep, rugged hills of that country rise on every side. It is a sight that stamps one's memory.

Until recently the soda was cut by hand and transported in wheelbarrows to the factory, but a modern harvester in the shape of a gold dredger was put into operation about June, 1923. This dredger has buckets with manganese steel edges that cut the soda easily. This material is pumped with a mixture of lake water to the factory at a rate which has been 8 tons per hour but which has been greatly increased by the recent installation of a new pump. At present the pipe from dredge to factory is nearly a mile long.

The mixture of material is almost black in color and is pumped into conical vats, from the top of which the water flows back to the lake, the soda settling to the bottom. The crystals are washed with water on special trays and are then spread out on the floor of the factory to dry. The final drying is carried out in a calciner fired with fuel oil, from which it emerges as soda ash and is ready for the mechanical bagging machine. The plant capacity is in the neighborhood of 200 tons of soda ash per day, with prospects for an immediate increase to nearly double that amount. Finally, the material is moved economically to the coast by rail and loaded on steamers for export at Mombasa.

Several items of news have significant economic and financial importance. The first is that the Magadi Soda Co. controls the Sun Soda Co., Ltd., in Japan, which acts as distributor. Shipment is usually made in 100-ton lots that are sold in transit. The fuel oil for calcination is obtained from the Shell Transport Co., in which Sir Marcus Samuels (Lord Bearsted) and Samuel Samuels have large interests. The latter has the controlling interest in the Magadi Soda Co. The offices of the latter company are also situated at Shell House, London.

No prediction of the possible scope and market for this soda is desirable or sensible, for there are many indeterminate variables. It is a development that should be watched with considerable interest, however, for the capital behind it is intelligent and substantial.

Economical Plant for Producing

Oxygen by the Liquefaction Process

Large Industrial Users of Oxygen Will Find This Process of Great Interest, for It Enables Them to Produce Their Own Oxygen at a Substantial Saving With a Plant Simple in Construction and That Requires Only One Man Per Shift

BY ALAN G. WIKOFF
Assistant Editor, *Chem. & Met.*

CHEMICAL ENGINEERING IN INDUSTRY

FEW industrial expansions of comparable magnitude have attracted as little general attention as that which has taken place in the oxygen industry during the last 15 years. The production of oxygen in this country for the year 1909 amounted to only 3,814,000 cu.ft. In 1919, only 10 years later, 1,173,414,000 cu.ft. was made and the present rate of production continues to be well above a billion cu.ft. per year.

This rapid rise has, of course, been due almost entirely to the extended use of the oxy-acetylene flame for welding and cutting, until at present many of the larger railroad shops, shipyards, automobile plants and similar industries require enormous quantities of oxygen. There has been a marked tendency to continue to meet this demand by supplying the oxygen in cylinders, the gas being produced in plants located at logical points for distribution, mainly by the air liquefaction or electrolytic processes.

Very few of the large industrial users of oxygen in this country have owned plants for producing the oxygen they require, because the economic use of the electrolytic process involved the disposal of the hydrogen simultaneously generated and until very recently there was no satisfactory liquefaction unit available. Within the past 2 years, however, there has been placed in successful operation in more than thirty plants a liquefaction system that should be of great interest to all large users.

Recently at Clearing, Ill., an industrial district along the great freight classification yards southwest of Chicago, I had the opportunity of studying this new process at the demonstration plant of the Oxygen Equipment Co. I fully expected to find it complicated and highly technical in character. Instead, here was a plant with a capacity of 25,000 cu.ft. per day of 99 per cent oxygen, requiring only 600 sq.ft. floor space, one man per shift to operate and consuming only one-fifth as much power as an electrolytic plant of the same size.

In outline, the process is exceedingly simple. Air is freed from carbon dioxide and suspended matter in caustic potash scrubbing towers, brought to high pressure in a multi-stage compressor, dried by solid caustic potash while still under pressure, liquefied by sudden expansion and oxygen separated by fractional distillation of the liquid air. But in practice each step is found to have features that merit detailed consideration. Fig. 1 will be of assistance in following the discussion of the process.

AIR PURIFYING TOWERS

Carbon dioxide and water vapor must of course be removed before the air is liquefied, as they would become solid at the low temperature and soon cause trouble by stopping up the pipe lines. For the removal of carbon dioxide, two purifying towers are used in series. The body of each is packed with iron rings, small sections of iron pipe. These are used in preference to coke, as the possibility of carrying over solid particles into the air line is thereby avoided. A constant circulation of caustic potash solution is maintained, passing from a spray head in the top of the tower, down over the filling material to a reservoir in

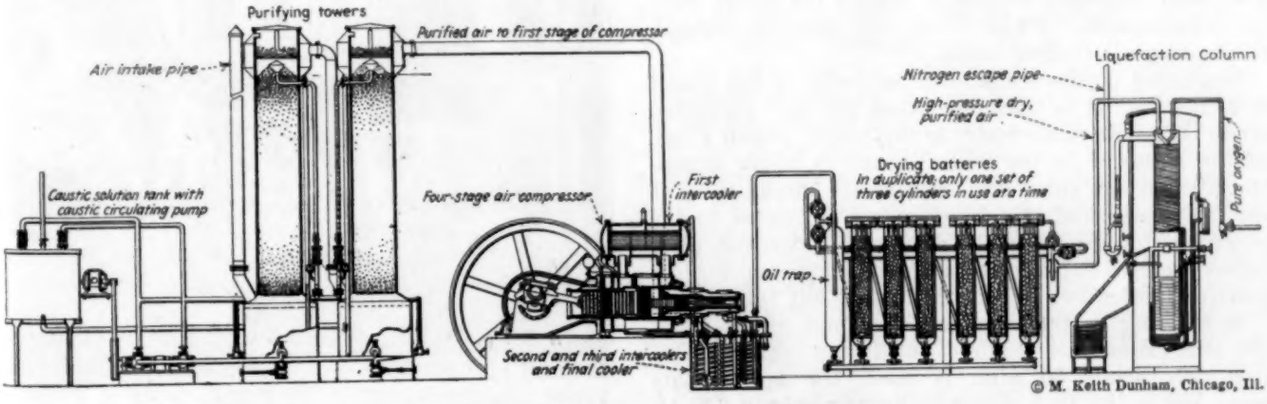

Purifying towers
Purified air to first stage of compressor
Air intake pipe
Liquefaction Column
Nitrogen escape pipe
High-pressure dry, purified air
Pure oxygen
Drying batteries In duplicate; only one set of three cylinders in use at a time
Caustic solution tank with caustic circulating pump
Four-stage air compressor
First intercooler
Oil trap
Second and third intercoolers and final cooler
© M. Keith Dunham, Chicago, Ill.

Fig. 1—Schematic View of Oxeco Liquefaction System

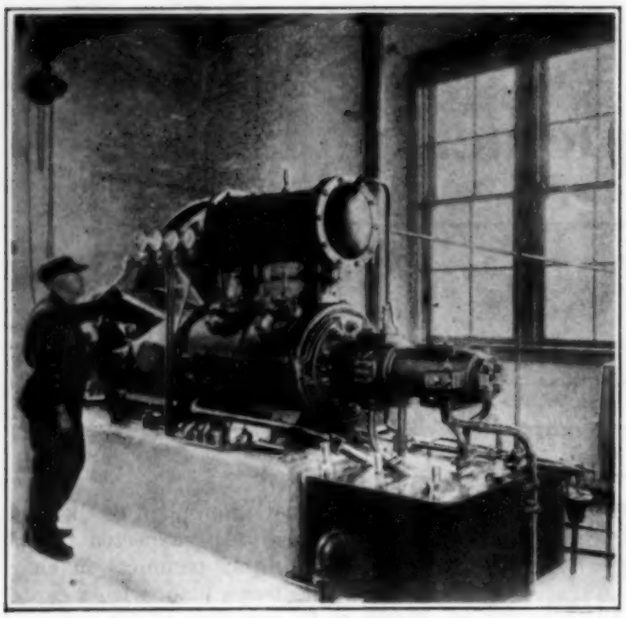


Fig. 2—Four-Stage Air Compressor

the base from which a pump returns it to the spray. By the suction of the compressor, air is drawn in the intake pipe and through the two towers in series, entering each at the bottom and leaving at the top, where a separator is provided to catch any particles of caustic or foreign matter.

Near the purifying towers is a tank in which the caustic solution is prepared. After a predetermined number of operating hours, the caustic solution in the first tower is discharged to the sewer, as it has ceased to be an efficient CO_2 absorbent. The solution in the second tower has had less work to do and is therefore only slightly carbonated. It is accordingly pumped into the solution tank, tested, brought up to strength and returned to the first tower, while a fresh solution is made up for tower 2. There are two caustic pumps, either rotary or centrifugal, so that each tower has its own circulating system. They are driven by a 1½-hp. motor, which may be direct connected or mounted on a wall bracket for belt drive.

Unusually Efficient Compressor Required

It goes almost without saying that the compressor is the heart of the system, as steady production is absolutely dependent upon a compressor which will work 24 hours a day without a hitch of any sort. The four-stage compressors (Fig. 2) used by these plants have been developed especially to meet the severe service requirements. Piston rings are used throughout, eliminating all stuffing boxes.

Beginning at the crank end, the order of the stages is 2, 1, 3, 4. It is thus impossible for any unpurified air to enter the compressor through leaky piston rings, as the pressure in the second stage is above atmospheric. Air can enter only through the intake valve of the first stage and this is of course connected to the purifying towers. Readily removable automatic plate valves are used entirely and a force feed system insures positive lubrication, a high flash point oil being used.

In starting up the liquefaction column, air at about 200 atm. pressure is required, but during normal operation only about 50 atm. is used, the approximate pressures in the four stages being respectively 2.2, 11, 40 and 50 kg. per sq.cm. (1 kg. per sq.cm. = 14.22 lb. per sq.in.; 1 atm. = 1.033 kg. per sq.cm.). Naturally a great deal of heat is developed during compression and rapid removal of this heat is imperative, for although a high-flash-point lubricant is used, prolonged contact of entrained oil mists with highly heated air or pipes might easily result in the formation of sufficient hydrocarbon vapors to interfere with the operation of the liquefaction column. The intercooler between the first and second stages is mounted directly over the cylinder, while the two other intercoolers and the after-cooler consist of pipe coils submerged in a water tank directly under the high-pressure end of the compressor. Heat exchange is remarkably efficient and the high-pressure air leaves the after-cooler at practically the temperature of the cooling water. This has a most important bearing on the efficiency of the whole process.

During compression some of the water vapor in the air condenses and collects in the coils of the coolers, being removed at intervals through suitable blow-off valves. Each cooler is also equipped with safety valves.

Final Purification of Air

Although the air is now at the pressure required in the column, it still contains water vapor, entrained oil droplets and traces of carbon dioxide. The air first passes to an empty steel cylinder through a pipe which extends from the top down to about the center of the cylinder. The sudden reversal of flow and decrease in velocity cause precipitation of the oil mist and much of the water. Condensate is removed through a blow-off valve in bottom of cylinder.

Remaining moisture and traces of CO_2 are removed in the drying battery, which consists of three steel cylinders containing drums of walnut-size KOH lumps, through which the air passes in series. An additional

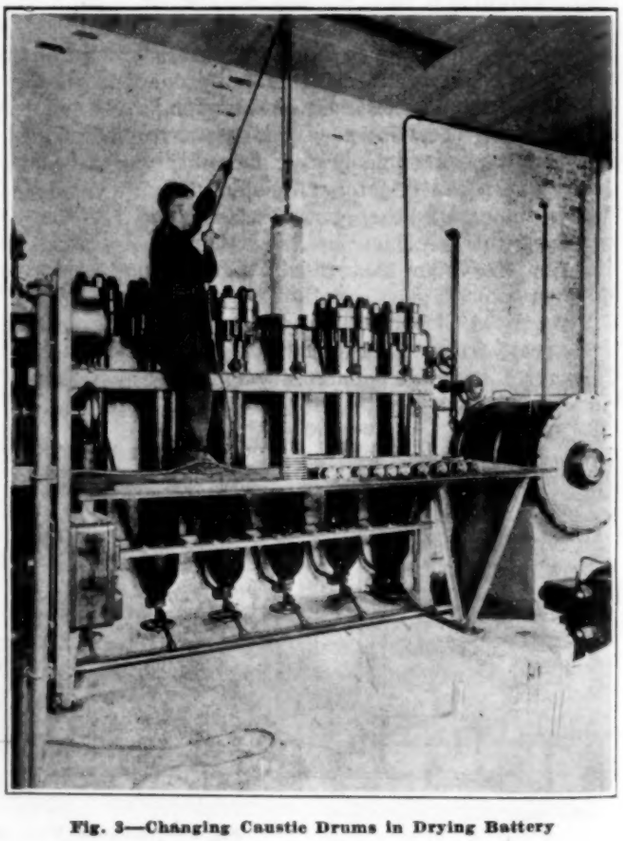


Fig. 3—Changing Caustic Drums in Drying Battery

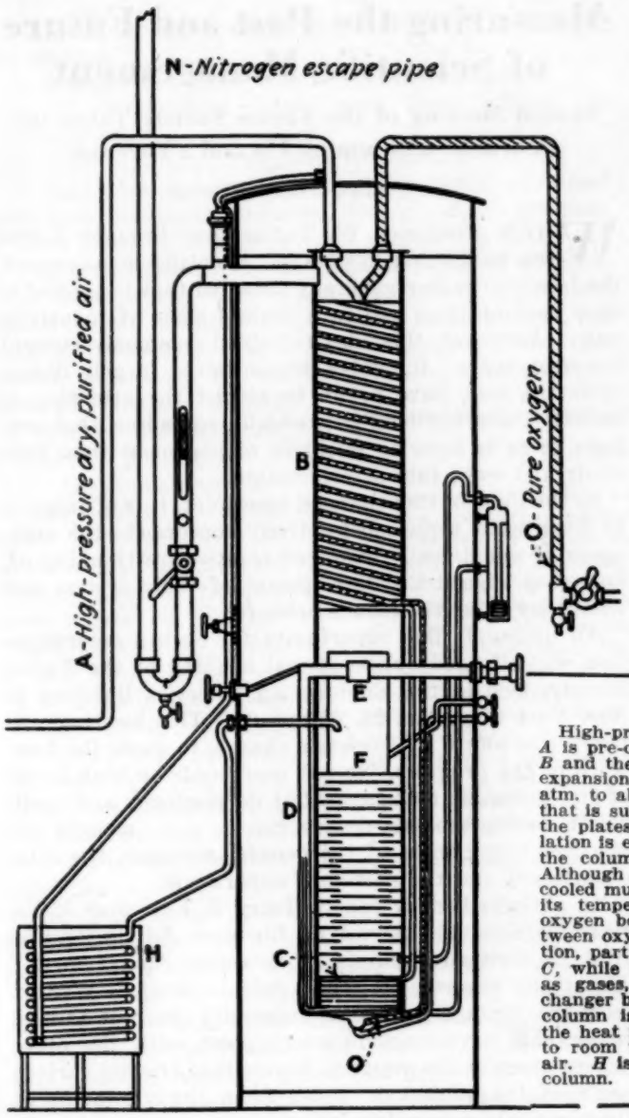


Fig. 4—Operation of Liquefaction Column

High-pressure dry, purified air entering the column through pipe *A* is pre-cooled by passing in turn through the heat-interchanger *B* and the coil *C*. The cold air then rises through pipe *D* to the expansion valve *E*, where the sudden drop in pressure from 50 atm. to about 6 lb. per sq.in. produces an additional cooling effect that is sufficient to liquefy the air. The liquid trickles down over the plates of the fractionating column *F*, where fractional distillation is effected by oxygen vapor which tends to press up through the column from boiling liquid oxygen surrounding the coil *C*. Although the air passing through the coil *C* has already been cooled much below room temperature in the heat interchanger *B*, its temperature is still relatively high enough to keep liquid oxygen boiling vigorously. The net result of the interaction between oxygen vapors and the liquid air on the plates is a separation, part of the oxygen collecting as pure liquid around the coil *C*, while the rest of the oxygen and all of the nitrogen escape as gases, absorbing heat from the incoming air in the interchanger before they pass out through pipe *N*. Pressure inside the column is sufficient to force liquid oxygen up pipe *O* through the heat interchanger *B*, where it is gasified and brought almost to room temperature by heat also absorbed from the incoming air. *H* is the heating coil which is used only when defrosting the column.

battery is provided so that the drums of caustic may be changed without interrupting the process. After one of the batteries has been in operation for a certain period, the cylinder heads are removed, the drum of caustic in the first cylinder taken out to be used in making up the solution for the purifying towers, drums 2 and 3 are advanced to cylinders 1 and 2, and a drum containing about 160 lb. of fresh lump KOH is placed in cylinder 3. The operation of changing drums is shown in Fig. 3. After replacing the heads this battery is ready for service when it is time to change the other one. As the caustic serves for both drying and purifying, the consumption is only about 1.5 lb. per 1,000 cu.ft. of oxygen. Following the drying battery is a small steel trap to remove particles of caustic which might be carried over.

Fractional Distillation of Liquid Air

Although the liquefaction column is apparently 12 ft. high by 3 ft. diameter, the column proper is only about 1 ft. in diameter, the remainder being insulating material. The construction is shown schematically in Fig. 4. The upper portion of the column is a heat interchanger. Near the center is the expansion valve and below this the plates which comprise the fractionating column. The purified compressed air enters the top of the heat interchanger through a spiral copper tube and as it passes down its heat is transferred to the fractionated products which are leaving the column. The air tube then drops to form a coil in the space below the fractionating plates and then rises to the expansion valve, where the pressure is suddenly reduced from 50 atm. to about 6 lb. per sq.in., causing the air to liquefy on the upper plates. Assuming that the column is in operation and not just starting up, the space below the plates contains pure liquid oxygen. This is being boiled by the incoming air in the coil referred to above, so that oxygen vapor is bubbling up through the liquid air descending on the plates. As the oxygen vapor condenses in contact with the liquid air, its heat of vaporization is transferred to the liquid air, tending to vaporize the more volatile component, which is nitrogen. By proper design, pure liquid oxygen collects below the plates, while nitrogen containing some oxygen (for complete recovery of oxygen is not economically feasible) passes in gaseous form up through the heat interchanger to the nitrogen escape pipe. The liquid oxygen rises through another tube in the heat interchanger and becomes gasified by heat from the incoming air. Heat interchange has been worked out very efficiently on this column and both oxygen and nitrogen leave the column at a temperature not much below that of the room.

Oxygen purity is checked regularly by the operator, using a gas pipette containing cuprous ammonium chloride solution. The purity can be regulated at will by manipulation of a valve in the nitrogen escape line.

After metering, the oxygen passes to a bell-type water-sealed gas holder, from which it is drawn as required to a three-stage compressor for filling into cylinders at 150 atm. pressure. For pipe-line distribution a smaller compressor may be used with a regulator to keep the line pressure constant.

With a plant of this type using pipe-line distribution it is easily possible for a large industrial user to reduce his oxygen costs by 50 per cent. As has been indicated, only one fairly intelligent operator is needed and the plant can be operated either intermittently or continuously with a shutdown of only 4 to 6 hours once a week for defrosting. After a 12-hour shutdown, oxygen is produced within 35 minutes from the time the compressor is started, while after defrosting (which consists merely in bypassing some of the compressed air through a heating coil and allowing the warm air to enter the column for about 2 hours to thaw out any ice or solid CO_2) oxygen is produced within 2 hours.

Fig. 5—Complete Oxeco Process Plant

Perhaps a better idea of the compactness of this type of plant may be obtained from Fig. 5, which shows a complete unit for producing 25,000 cu.ft. of oxygen per day. At the right is the compressor, while along the left wall may be seen the meter in the foreground, followed by the liquefaction column, drying batteries, purifying towers and, in the extreme background, the caustic solution tank.

It will also be apparent from the foregoing description of the process that it is admirably adapted for the production of liquid oxygen where this may be desired, as for example, in connection with liquid oxygen explosives.

For the opportunity to inspect this process and for data embodied in this article, the writer is indebted to M. Keith Dunham and Don B. McCloud, of the Oxygen Equipment Co., Chicago, Ill.

Canadian Lime Production Analyzed

The total value of lime produced in Canada in 1922, says the Dominion Bureau of Statistics, was $3,165,005, an increase of 12 per cent over the 1921 production, which amounted to $2,781,197. The total production comprised 7,698,028 bu. of quicklime valued at $2,622,726 and 44,623 tons of hydrated lime valued at $542,279. About 29 per cent more quicklime was sold in 1922 than in the preceding year, but the value of these sales was only 12 per cent higher. Likewise the production of hydrated lime increased 39 per cent in quantity and only 24 per cent in value.

Production of Lime in Canada in 1922

Supplied to the Industries Shown Below	Quicklime		Hydrated Lime	
	Bushels	Total Selling Value at Kiln	Tons	Total Selling Value at Kiln
Building and whitewashing	1,334,769	$450,861	34,500	$440,433
Chemical works	1,772,786	605,547	2,194	18,697
Smelters	169,329	69,450	.....	.....
Pulp and paper mills	2,044,777	598,550	3,173	32,513
Sugar refineries	275,685	100,821	.....	.....
Tanneries	43,979	15,145	3	37
Agriculture (fertilizers)	38,671	4,450	1,083	10,384
Dealers (uses unspecified)	1,363,309	621,493	3,418	37,948
Others	654,723	256,409	252	2,267
Total sold or used	7,698,028	2,622,726	44,623	542,279

Measuring the Past and Future of Scientific Management

Annual Meeting of the Taylor Society Takes the Form of a Summing Up and a Forecast

EDITORIAL STAFF REPORT

WHEN Frederick W. Taylor first brought before the public his system of scientific management, the idea was rather generally accepted that it applied to shop control alone and in a limited class of industries only. Moreover, this idea remained commonly current for some years. But later developments, largely dating from the war, have begun to attract the attention of industry, and the idea is gradually spreading that perhaps there is more to scientific management than time study and wage rate determination.

In the light of this changed viewpoint, it is of interest to learn what those most actively concerned—the managers of scientifically managed plants—are thinking of, how they regard the development of their system and what they think the future holds for it.

An unusually fine opportunity for such a determination was afforded by the annual meeting of the Taylor Society, held at the Engineering Societies Building in New York City, Jan. 24, 25 and 26. This meeting was planned to afford the society a chance, to quote the foreword of the program, "to put on record the high lights of its [scientific management's] development and application during the past decade, the . . . aspects emphasized being those of the general manager, the sales department and the personnel department.

As an introductory paper, Henry B. Farquhar of the Harvard Graduate School of Business Administration read "A Critical Analysis of Scientific Management." This study covered the whole field in brief. Written from the vantage point of a university chair, it showed remarkable agreement in every point with the other papers given at the meeting, papers that treated various parts of the subject in detail from the viewpoint of those actively engaged in industry.

Among these papers were: "Types of Management: Unsystematized, Systematized and Scientific," by H. P. Kendall, Boston, Mass.; "Scientific Management and General Administrative Control," by John H. Williams, New York; "Scientific Management in Selling and Advertising," by Stuart Cowan, J. Walter Thompson Co., Cleveland; "Personnel Work in Scientific Management," by Mary Gilson, Joseph & Feiss Co., Cleveland; "Scientific Management in Federal, State and Municipal Business," by Morris L. Cooke, Philadelphia, and "Scientific Management in Other Countries Than the United States," by Frank B. and Lillian M. Gilbreth, Montclair, N. J.

The work of Taylor did not result primarily in laying down a system, but in outlining a philosophy of scientific management. The essence consists in the use of certain governing principles and the mechanism of their application is unimportant. On this premise, that the object of Taylor's work was to harmonize the interests of management and men, the principles were restated thus:

1. Business is organic.

2. Thorough standardization and scientific methods throughout business are necessary.

3. The interests of employer and employee in business are mutual.

4. Management must take its full responsibility.

5. All development must come from within the organization.

6. This development must be democratic.

7. And this development must be based on sound principles constantly enforced through sound methods.

With these principles to form a basis for judgment, the advances made incident to the application of scientific management were stated to include high-speed steels, better working tools, better cost systems, increased production from a given equipment and personnel, regulation of the materials of manufacture, accurate routing, control of process and accurate production planning.

On the human side advances equally as great have been achieved in scientifically managed plants. There is freedom from unrest on the part of the workers. A spirit of fair dealing and co-operation has been brought about. Factory environment, as concerns the worker, has been made more healthful and pleasant. Control of production has made possible high wages and good hours. Fatigue has been studied to determine the best day's work a man can do and thrive. And finally, much has been done to make the worker a better citizen.

Considering the worker as a plant tool, important advances have been made in his selection, fitting to a particular job and training for that job. Labor turnover has been reduced, which has proved to result in noticeable plant economy. But the greatest advances that have been made in industrial relations in scientifically managed plants are the greater co-operation between labor and management, the increased feeling of confidence in the management which labor now has and the growing feeling of security of job which the worker holds. These last three advances have been more important that all others in making possible the attainment of true scientific management.

What the Future Holds

As the science and the art of management improve those most actively engaged therein are enabled to outline the obligations and problems that must be met in the future. Due to industry's growth it is becoming ever harder to find foremen that are adaptable to the needs of scientific management. A way must be found to insure that a supply of such foremen are trained and available as needed. The success of any system that may be used for attaining the ends set down in Taylor's philosophy is dependent on having foremen that understand the system and can put it into effect without encroaching on the worker's rights.

Perhaps as important as anything else that now demands attention is an increase in the amount of labor-saving machinery employed. The use of this machinery makes easier the working of scientific management and at the same time it helps to solve the problem of an ever-increasing shortage of labor supply. Further studies must be made of fatigue so that the worker's task may be set more intelligently. The mechanisms by which scientific management is attained are ever subject to improvement and there must be no failure to continue such improvement.

The distribution system of the country is outgrown and until this is corrected, which may not be soon, much study must be given to this subject in order that selling costs may be decreased. Similarly, selling is more difficult than it was in the past. The present market is a buyers' market and is likely to remain so for some years. This makes a scientific analysis of selling possibilities a necessity, and such analysis can be best made by using the principles of scientific management. Another phase of this sales and distribution situation is that manufacturing to order is a thing of the past and the problem of manufacturing for stock must also be studied.

Many other problems besides the above—which are perhaps the most important—confront scientific managers for solution. The mention of a few of these will show the nature of the future task of those who are making the advancement of scientific management their life work. Among these are the standardization of raw material, the study of the business cycle, the improvement of industrial relations and the fostering of relations with organized labor, the development of means for leading bankers to look beyond the balance sheet of business, the establishment of a measurement of management and the improvement of management to cause it to assume its full responsibility for industry.

Why the Taylor Society?

Some of our readers may ask this question; and, as the connection between this society's activities and the field of "Chem. & Met." is not at once clear, we wish to call the reader's attention to the reason why its activities are worth study. This is a period characterized by a hard, competitive market—a buyers' market. And the plants that are doing the best percentage business in the country in the face of this market are the scientifically managed plants. Scientific management is a universally applicable philosophy, not a circumscribed mechanism of but narrow utility. It is as helpful to a chemical plant as it is to a machine shop. And where can we better go to find out about it than to that organization, the members of which make it a lifetime study —the Taylor Society?—EDITOR.

Must Use Pure Oxygen in Rescue Work

The purity of the oxygen used in mine-rescue apparatus is very important, since impurities in oxygen tend to accumulate in the circulatory system of the apparatus. The Department of the Interior specifies that oxygen supplied for use in the mine-rescue apparatus of the Bureau of Mines shall contain at least 98 per cent of oxygen, no hydrogen and not to exceed 2 per cent of nitrogen with traces of argon.

Oxygen made by liquefaction processes ordinarily conforms to this standard and contains only nitrogen with traces of the rare inert gases as an impurity. Oxygen manufactured electrolytically is likely to contain hydrogen in amounts ranging from a few tenths of 1 per cent to several per cent. An oxygen-hydrogen mixture containing 5.5 per cent or more of hydrogen is flammable. Such a mixture can easily accumulate in a breathing bag in 2 hours if oxygen containing appreciable amounts of hydrogen is used.

Hydrogen, like nitrogen, has no poisonous effect if breathed. On account of the possibility of accumulation of explosive mixtures, the Bureau of Mines requires that all of the oxygen it uses in rescue apparatus be free from hydrogen.

Do You Know as Much as You Should About

Ferro-Alloys

Their Importance to Industry Is Not Generally Appreciated, Because They Do Not Appear as Finished Industrial Materials

By Frederick M. Becket
Metallurgist, Union Carbide & Carbon Research Laboratories

The 1923 Perkin Medal has been awarded to Frederick M. Becket in recognition of "the most valuable work in applied chemistry." On receiving the award he presented a most interesting discussion of the field in which this work was done. This article is the first of three that go to make up Becket's discourse. The two others will follow in later issues of "Chem. & Met."

RATHER than ask you to follow a detailed description of a single process or product, I have deemed it more interesting to discuss broadly the field of ferro-alloys and certain alloying metals. None of the metals in this category appear as finished industrial materials, and probably for this reason their importance to industry is not generally appreciated, even among chemists. Nevertheless, the members of this group of metals contribute to and in several cases wholly impart the valuable properties to numerous products employed in the arts. I therefore feel justified in attempting to set forth here a fair appraisal of the essentiality of this relatively young industry, in addition to describing briefly some of the historical and technical features of a number of the group.

Commercial ferro-alloys now utilize the specific effects to be obtained from about a dozen metallic elements, although various combinations of these elements lengthen the list to a score or more. Several of these alloys are interesting and important enough individually to take up a whole series of articles. However, in an article of this character I trust that I may be pardoned for very brief mention of some important alloys and for dwelling at greater length upon others in the industrial development of which I have been most actively engaged, especially products in the manufacture of which the electric furnace plays an important part.

You are all aware of the necessity of deoxidizing or scavenging molten steel, whether made by the open-hearth, bessemer, electric furnace or crucible process. This is the most important rôle of some of these ferro-alloys. Other alloys are designed to remain in the steel in appreciable percentages and result in the remarkable alloy steels of high strength, toughness, hardness or resistance to corrosion, as well as in other products not classed as steels which will appear as we proceed.

Let us turn our attention to that alloy most often used for deoxidizing steel—ferrosilicon.

Credit is due, I believe, to Guillaume de Chalmot for the experimental work and inventions which eventuated in the commercialization of electric furnace ferrosilicons containing 25 per cent and higher contents of silicon. This work was conducted between the years 1893 and 1895 at Spray, N. C., in the plant where commercial production of calcium carbide was started. Europe (chiefly France and Switzerland) soon commercialized electric furnace ferrosilicons abroad and exported to the United States in gradually increasing quantities for several years prior to actual manufacture in this country.

The Story of Ferrosilicon

In 1907 the commercial production of ferrosilicon was started at Niagara Falls, N. Y., in electric furnaces of considerably larger capacity than had ever before been constructed. The year 1907 is an important one in the history of the American ferro-alloy industry; because, in addition to ferrosilicon, this year saw the commercial application of processes for the manufacture of some other alloys the production of which has been also continuously maintained.

Many were the difficulties and disappointments that resulted from this very attempt to utilize relatively large units. Electrical rather than metallurgical problems predominated, and these were chiefly due directly or indirectly to the unexpectedly high electrical inductance and therefore low power factor of these furnaces. Think of designing a furnace for a given load and carefully applying past electric furnace experience in the copper work, electrode and other details, only to find that because of a very low power factor sufficient electrical energy could not be developed in the furnace to attain the temperature required for efficient metallurgical operation, not to mention specifically the numerous troubles that resulted from the very heavy currents drawn in these low power factor circuits. Bearing in mind that all of this was not the work of novices, but of several engineers of considerable commercial electric furnace experience, including my own experience, which had involved a careful study of power factor in more than one particular case, you can readily understand not only the keen disappointments but the ultimate great value derived from these failures.

The fragility of the large electrodes of those days was a source of much trouble through interrupted operation. Also, it should be remarked that much was then learned concerning the effect of the physical nature of the raw materials and particularly the effect of all classes of carbonaceous reducing agents on the electrical characteristics of the furnace. However,

although these sad experiences were dearly bought because of the relatively large scale of the operations, they were later capitalized to great advantage not only in the manufacture of ferrosilicon but also in the large furnace production of calcium carbide. The work progressed, and it was not long before still larger and quite efficient furnaces were in operation. In view of our natural pride in the success of domestic industries, it should be of interest to know that not only have we regularly operated at Niagara Falls, N. Y., for at least the past 14 years appreciably larger furnaces than have been employed in Europe, which I realize is not in itself a criterion of success, but both the energy and metallurgical efficiencies have exceeded the results obtained in the European countries manufacturing ferrosilicon. Indeed, these higher efficiencies have assisted greatly in meeting the keen competition of Europe, where hydro-electric power, labor and often the raw materials have been more cheaply obtained than in this country.

Did you know that the "chemical reagent" ferrosilicon enters into 90 per cent of all the steel manufactured in this country? The advantages in the use of ferros containing 50 per cent or more silicon are such that, were we compelled to fall back on the lower percentage ferrosilicons made in the blast furnace, our steel production costs would increase considerably. As this would seriously affect industry, the importance of ferrosilicon is obvious.

Metallurgical difficulties were not great during our early history in the ferrosilicon business, relatively speaking. However, let me draw your attention to the peculiar phenomenon generally known as the disintegration of ferrosilicon. Numerous explosions and several deaths in Europe led to investigations that resulted in the conclusion that phosphine liberated from disintegrating ferrosilicon was the cause of these disasters. Regulations governing the transport of ferrosilicon were formulated and many of the prominent steamship companies would not accept this alloy for delivery across the Atlantic. Most of the exporters of ferrosilicon to the United States adopted the preventive measure of dipping the alloy in paraffine, but as the paraffine coating was disliked in this country, we desired to eliminate the necessity of the treatment by producing a stable 50 per cent ferrosilicon.

Several papers by foreign investigators have been presented in explanation of this singular behavior of ferrosilicon, but from my own study of the subject, which has been chiefly practical in nature, I am convinced that not all the influential factors have been discovered. One thing we do know positively, and that is the practical means of avoiding disintegration. By keeping the phosphorus content of all raw materials extremely low, the trouble vanishes; if this precaution is not observed on economic grounds, then the producer of 50 per cent ferrosilicon must face the even more troublesome task of maintaining below certain low maxima the percentages of other elements, for example calcium and aluminum.

Uses of Ferrosilicon

What are the principal uses of ferrosilicon, and what of its importance? First let me remind you that more than 75 per cent of the total steel produced in the United States is made by the basic open-hearth process. Now, ferrosilicon of the 50 per cent grade and in less extent ferros of higher silicon content are employed as the principal deoxidizers of substantially all basic open-hearth steel. Considering that these grades of ferrosilicon are used to some extent in all other steel-making processes, the figure 90 per cent can be given as an approximation of the proportion of steel in this country into which these alloys enter. The advantages in the use of ferros of 50 per cent and higher silicon content are such that were we compelled to fall back on the blast-furnace product, containing even up to 15 per cent silicon, our steel-making practices would have to be greatly modified, the production costs would increase, and huge investments would be necessary in the way of melting cupolas and other auxiliary equipment.

The steel-casting industry is well-nigh dependent on electric furnace ferrosilicon for the production of sound castings, adding enough of this material to yield about 0.3 per cent in the finished steel. In the manufacture of spring steels sufficient silicon (1½ to 2 per cent) is added to impart special physical properties, and almost all our precious automobiles are equipped with so-called silicomanganese steels. Passing to steels of still higher silicon content, I must mention the "non-aging" steels so largely used in electrical apparatus. With a silicon content of 3½ to 4½ per cent, and after proper heat-treatment, the hysteresis curves of these steels represent less energy expenditure and remain much more permanent than those of the previously used best soft irons. These steels have effected a tremendous saving not only in power but in the cost of periodic renewals of inefficient transformer cores. In the manufacture of transformer sheet the alloys of 75 to 90 per cent silicon content are preferred.

The inflation of dirigible and other balloons requires the generation of hydrogen in considerable quantities, and in military operations the gas is often needed in large and promptly available quantities at frequently shifting points. During the war large quantities of 80 to 85 per cent ferrosilicon were consumed for this purpose. The simplicity of the well-known reaction between silicon and caustic soda, the large volume of hydrogen liberated per pound of transported raw material and the portability of the generating plant admirably suited this process for war service. In general, however, this process is not an economical one for large permanent installations.

Status of the Industry

I believe an erroneous impression existed for a good many years concerning the status of the electric furnace alloy industry of the United States, largely because prior to the war there appeared in the technical and popular press numerous references to the much greater progress that had been made in Europe in the ferro-alloy and other electric furnace industries, and also because of similar statements in more recent years to the effect that the war "made" the ferro-alloy industry of the United States.

May I do a little here toward modifying this adverse view, and by occasional remarks under the various headings in what follows,, have you look more appreciatively upon the enterprise and accomplishments of your own country?

So far as ferrosilicon is concerned, there was sufficient producing capacity in this country by the year

1910 to meet the entire consumption, and imports had dropped to a small proportion—in fact, most of the imports came from a plant located at Welland, Ont., which commenced manufacture not long after the Electro Metallurgical Co. started at Niagara Falls. When in 1915 an unprecedented demand for ferrosilicon arose in the United States as well as in Canada and the European countries, the Electro Metallurgical Co. met the domestic emergency by practically doubling the production within a period of a few weeks. Of course, it should be remarked, such an accomplishment was not made without sacrifice, which in this case affected the output of an allied industry, calcium carbide.

Silicon Important for Shell Steel

I believe it not an exaggeration to state that without this greatly augmented supply of ferrosilicon the United States producers would have been compelled greatly to curtail the orders for steel for European account, especially shell steel, which averaged an unusually high content of silicon. Continuance of the war resulted in still greater demands, and additional equipment was installed to such an extent that at all times during this strenuous period the limitation was that of available power and not producing capacity. As in many other industries, the peculiar conditions of war time invited the formation of new companies and the construction of some new plants; but, again drawing an analogy to other industries, not all of these have survived.

Briefly, then, notwithstanding the relatively small tonnage of imports during that period, the United States has been potentially and as a matter of fact actually independent of Europe for all grades of ferrosilicon for at least the past 14 years. The importance of this military independence from the standpoint of maintaining in the United States an industry upon which the economical production of steel depends can scarcely be overestimated.

Metallic Silicon

Some day the commercial world may decide where ferrosilicons end and silicon metal begins. I have in mind just now a product containing at least 95 per cent silicon in which iron is generally considered an impurity.

I must not depart from silicon without telling you of the most recent important application of this metal. I refer to the use of appreciable percentages of silicon (up to 17 per cent) in aluminum castings, which actually arose from the brilliant work of Dr. Aladar Pacz on aluminum-silicon alloys. The physical properties of these alloys are remarkably enhanced when modified by the Pacz treatment, and probably of even more importance is the fact that their lower shrinkage in castings has done much to remove what was formerly the bane of aluminum foundrymen. If you possess a recently made motor-car, it may have a crank case and other parts of aluminum-silicon alloys; if it has not, you will almost surely own one in the future, because these alloys are of high merit and represent a marked improvement.

This is the first of three articles on ferro-alloys, the interesting points in the story of their development and the importance of their part in present and future industry. The second article will appear in a later issue of "Chem. & Met."

Recovering the Sludge Acid in Benzol Refining

Method Recently Developed in Germany Uses Ammonia Neutralization Instead of Usual Washing and Concentrating

By H. Schlamp
Bochum, Westphalia, Germany

THE sulphuric acid that has served its purpose in washing benzol and other products from light oil is a very troublesome waste in the average byproduct coke plant. Its disposal is complicated by the fact that the acid is of sufficiently high concentration to do material damage to the sewers, and furthermore it contains a considerable quantity of benzol, partly in chemical combination and partly in a state of emulsion. From an economical viewpoint, therefore, it is essential that wherever possible the acid should be recovered. This operation—that is, the washing, or regeneration of the acid, as it is sometimes called—is ordinarily carried on in an iron vessel by means of steam.

The vapors that result from the heating of the acid are condensed in a cooling apparatus, thus allowing the recovery of the benzol and its related products, while the other vapors, SO_2 for instance, generally are allowed to escape into the open air, causing disagreeable odors and sometimes doing actual damage to the surrounding country. The resulting dilute acid is either led to the ammonia saturators or is concentrated for its sulphuric acid content.

Use of Ammonia Liquor

Although a number of processes have been suggested for the regeneration of the waste acid, many of them have the disadvantage of producing a considerable quantity of black, resinous sludge that is rarely if ever utilized. Since 1914, however, a process has been put into successful operation in Germany that overcomes the principal disadvantages attributed to other methods. Directly after the crude benzol is washed with sulphuric acid it is diluted with water, and ammonia liquor is added. When the contents of the vessel have settled down, three different portions will be distinctly evident: A strong solution of ammonium sulphate at the bottom, the segregated oily and resinous portion in the middle and the benzol at the top. On separating these portions, the solution of sulphate is taken to the saturator, the resinous matter goes to the tar-distilling plant, and the benzol is refined in the usual way.

This method of washing the benzol has the advantage of eliminating one distilling operation, although it does entail the consumption of a larger quantity of sulphuric acid. What eventually might be an obstacle to this process in its general introduction is a possible lack of concentrated ammonia liquor or caustic alkali for the neutralization. However, whenever concentrated ammonia liquor is at hand, the process can be applied without difficulty and to the best advantage. The main feature of this process is that it involves no special apparatus or more labor than is required in an ordinary washing process, and furthermore all of the benzol is recovered. The fear expressed in some quarters that waste acid would corrode the tar tanks and stills has proved to be without foundation, since the sulphuric acid is completely neutralized by the ammonia liquor.

British News Notes

FROM OUR LONDON CORRESPONDENT

LONDON, Jan. 8, 1924.

THE excitement of the general election has now passed and the net result is that protection has received a staggering, if not mortal, blow at the hands of the electorate, and that a stable government will now be replaced by an unstable one. On the other hand, the fact that no single party will command a majority will prevent the passing of any drastically new or premature legislation. The position of the chemical industry will therefore, so far as legislative action and interference are concerned, probably remain *in statu quo*. It is true that the Liberals would probably like to amend or repeal the safeguarding of industries act and possibly also the dyestuffs act, but it is unlikely that they would succeed.

The organizers of the British Empire Exhibition, to be held at Wembley Park, near London, from April to October, 1924, have planned a publicity campaign on behalf of chemistry that will beat all previous records in this country. In spite of press assertions to the contrary, the commercial results that have accrued to the industry from the past few exhibitions at the British Industries Fair have been inconsiderable, and there is now a good opportunity to do better, particularly as the *Times* informs us that the prospects for trade generally are much brighter.

The subject of publicity for chemistry was dealt with by F. E. Hamer, editor of the *Chemical Age*, in a recent paper before the Manchester Section of the Society of Chemical Industry. The author, who is a well-known trade journalist, emphasized the need of real public-spirited leaders and regretted that there is no one to take the place of the late Lord Moulton. He also stated his conviction that the public cannot be educated through official publications, and urged the institution of a good clearing house for information concerning the science and industry.

ITALIAN POTASH DEVELOPMENT

Good technical papers have been remarkably scarce of late. Among the more interesting was one by Prof. J. W. Hinchley on "A New Source of Potash," in which he described the nascent large-scale development of the enormous resources of leucite in Italy. The pure mineral contains 21.5 per cent potash (K_2O) and 23.5 per cent alumina, and it is estimated that the deposits around Rocca Monfina, an extinct volcano lying about 30 miles north of Naples, 12 miles from the seaport of Scamin, contain over 1,000 million tons of potash, and the leucite lavas available over the whole range nearly 9,000 million tons. The process of extracting consists in separating iron electromagnetically, treating with sulphuric acid to produce potash alum and utilizing the separated silica for making sodium or potassium silicate. Alternatively the crushed and purified mineral may be decomposed with hydrochloric acid gas, and to furnish potassium chloride and hydrated aluminum chloride, which on heating to 300 deg. C. is converted into hydrated aluminum oxide. The fine dust formed when the mineral is crushed has been shown by Dr. J. A. Voelcker to be a very useful fertilizer, its value being practically equal to that of Stassfurt salts of the same potash content. The author was unable to give any figures of costs, but he stated that the cost of production was much lower than that of other sources of potash. Potash alum was manufactured from Italian leucite in the north of England by a big firm about 13 years ago, but was abandoned because the demand for the product was not sufficiently great. It is well known that large quantities of leucite are found in the United States; unfortunately, however, the American mineral is not amenable to simple treatment with sulphuric or hydrochloric acid.

IMPORTANT SOCIETY MEETINGS

The Chemical Industry Club, which has just completed the fifth year of its existence, has held its annual meeting and a very successful annual dinner. The membership is well maintained at about 700, finances are healthy and prospects good. For the first time since its inception there has been an important change in personnel, H. E. Coley, the first Hon. Secretary, and C. J. Goodwin, the first Hon. Treasurer, having retired from these positions amid the encomiums of all connected with the club; Dr. E. H. Tripp, late review editor of the *Journal* of the Society of Chemical Industry, and T. Miller Jones, chemical manufacturer, have been elected to fill the vacancies. J. Arthur Williams has been appointed assistant secretary.

The Institute of Chemistry held a highly successful dinner on Dec. 10, at which no fewer than sixteen speeches were made. Viscounts Milner and Haldane were the principal guests, and the much desired publicity in the daily press was achieved, thanks in no small measure to the fact that the former had to retire owing to the lodging of a fishbone in his throat, which was happily removed without further mishap. The Institute of Chemistry has proved itself a most valuable organization in maintaining the professional status of chemists.

Among news of a personal character, the death of Prof. Frank Clowes, at the age of 85, is universally regretted. He occupied the chair of chemistry at University College, Nottingham, from 1881 to 1897, when he became chemical adviser to the London County Council. He was the author, with Prof. J. B. Coleman, of textbooks on analytical chemistry which still enjoy enormous popularity throughout the Kingdom.

Regret is also felt at the retirement of Professor Dunstan, now Sir Wyndham R. Dunstan, F.R.S., from the post of director of the Imperial Institute, consequent on its reorganization. Under Professor Dunstan this Institute has done exceedingly valuable work in developing the resources of the colonies and British dominions beyond the seas, and in many quarters it is regarded as a misfortune that the Institute's valuable collection of overseas products is now to be distributed to make room for the remains of the Imperial War Museum, which has hitherto been housed in the Crystal Palace.

Some interesting particulars of the British gas industry have been published by the Board of Trade. The number of gas undertakings operating in England, Wales and Scotland is 797, possessing a total nominal capital of £162,929,025 (more than 700 million dollars), this sum including loans borrowed and since repaid. For the year 1922-23 receipts amounted to £70,826,651 (a decrease of £8,000,000), expenditure to £59,149,435 (a decrease of £13,500,000), and the net profit of £1,768,833 compares with a net loss of £1,102,815 for the previous financial year.

How Far Can the Trade Association Go in Co-operative Service to Industry?

This Question So Vitally Affecting Many Activities of Organized Business Is Answered in the Light of Authoritative Legal Opinion

By Herman Oliphant
Professor of Law, Columbia University, New York City

FOR what purposes may trade associations be organized without violating the Sherman anti-trust act? What activities of such associations are legal and what illegal? The usual activities of these associations can be arranged in a series or a graduated scale. At one end are acts clearly legal—for example, joint advertising. At the other end are activities clearly illegal, such as express contracts fixing the prices to be charged by the association members. The exact dividing line between legal and illegal activities is still unknown. The legality of numerous activities lying in the middle reaches of this scale is still doubtful, and that of one such—viz., the interchange of information as to past transactions, including production, sales, prices and stocks on hand—is at this moment a most important question, enlisting widespread interest. It is the principal subject of this discussion.

To begin with, the activities clearly legal, some of them beyond question, are those listed by Knox, D. J., in the consent decree issue in U. S. vs. Gypsum Industries Association. They are: To increase the use of gypsum by publicity, to conduct research as to technical and trade problems, to furnish traffic information, to handle traffic problems before governmental agencies, to furnish credit information and to "deal with improved methods of plant and mine operation, including sanitation, safety appliances, accident prevention, labor, plant and mine development, housing conditions, insurance and methods of accounting."[1]

At the other extreme, much of the law as to what acts of trade associations are illegal is clear and definite. Competitors may not agree among themselves to maintain or change prices, limit production to sustain prices, divide up territory among themselves, or likewise apportion customers or competitive products. Doing these things is what is meant by restraining trade. It is illegal for competitors to agree or contract among themselves to do them. The contract or agreement need not be expressed in words to be illegal. It may be inferred from conduct.[2] Tacit understandings are as bad as any. If there is a purpose to have concerted action—for example in fixing prices—any understanding to that effect, however subtle, is fatal.

All this is settled and the courts have passed on to consider the further questions—namely, What conduct will be taken to have proved or established such illegal agreement? It is this point upon which the Supreme Court was ruling in United States vs. American Linseed Oil Co. The court there held illegal under the Sherman anti-trust act separate arrangements made by competitors with the Armstrong Bureau of Related Industries, an independent organization, whereby each bound himself under penalty of a fine to report all past sales, to send in price lists and promptly to report any lower prices quoted. The bureau agreed to relay all facts so gathered to other members. These reports disclosed to all members the identity of the customers and the transactions reported. The test applied by the court was thus stated:

> If, looking at the entire contract by which they are bound together, in the light of what has been done under it, the court can see that its necessary tendency is to suppress competition in trade between the states, the combination must be declared unlawful.

After reciting the facts here summarized, the court said:

> With intimate knowledge of the affairs of the producers, and obligated as stated, but proclaiming themselves as competitors, the subscribers went forth to deal with widely separated and unorganized customers, necessarily ignorant of the true conditions. Obviously they were not bona fide competitors; their claim in that regards is at war with common experience and hardly compatible with fair dealing.

This is the last word spoken by the Supreme Court on the illegality of trade association activities. How it will rule on all of the numerous activities lying in the twilight zone between clear legality and illegality it is impossible to say and almost futile to consider.

All of the arrangements for the interchange of information so far condemned by the federal courts have had these two things in common: (1) The information sent in by members to the central agency to compile and distribute, whether the central agency was the association's secretary or an independent firm, disclosed: (*a*) the name of the member reporting; (*b*) the identity of the customers involved in the sales, and quotations which were being reported; and (*c*) the identity of the transactions in question. (2) The central agency relayed to members not mere unidentified totals but all of this information, or else a member, by request, could obtain all of these details. The Supreme Court has taken the position that little need be added to these two facts to establish an agreement *to restrain trade* as already defined. The only other important fact in the Linseed case was the express agreement, not to restrain trade, *but merely to do these two things.* The natural tendency of such an arrangement to lead members to avoid competitive bidding and to follow the price policies of their most successful competitor makes the inference of a purpose and an understanding to suppress competition a likely one, although supported by little

[1] But a uniform system of cost accounting used as a part of the machinery to secure uniformity in prices by agreement is doubtless illegal, as has been held recently by the Federal Trade Commission.

[2] This was the question involved in such cases as the American Column Lumber case. The opinion in that case is illuminating on this point.

Recent adverse court decisions have cast a pall of uncertainty over many of the recognized activities of the trade association. Many see in them the threat to undermine the statistical foundation of industry, to destroy the source of business knowledge which Secretary Hoover has recently declared "is essential to the consumer, producer, manufacturer and distributor, as it places them all in a position to interpret and judge market conditions intelligently on the basis of supply, demand and current prices. and to gage their purchases and sales accordingly."

The legitimate trade association will find in this article a distinctly encouraging view of the situation. Professor Oliphant holds that our organizations engaged in the collection and distribution of general information on an industry as a whole have nothing to fear provided their activities do not in any way involve, openly or tacitly, the fixing of prices or the restraint of normal competition in any other manner.

other evidence such as secrecy, frequent meetings of competitors and a too marked lessening of price changes.

The Linseed case goes no further than to condemn arrangements having these two characteristics, nor does any other case in the inferior federal courts that has come to the writer's attention. It is true that in cases such as the Gypsum case the decrees issued have gone further, prohibiting members, "*in any manner whatsoever* to circulate among themselves, *in any way*, information concerning or relating to . . . prices *charged* or to be charged." But this rests on wholly separate grounds. The court, having found a combination illegal, may make such orders as it deems necessary to effectuate its decree. For example, in the Gypsum case it dissolved the *voluntary association*, allowing the formation of a *corporation* to carry out policies clearly legal. But no one would contend that members of other industries might not organize a voluntary association to do things clearly legal.

Who Shall Receive the Reports?

Now, at the other extreme, it is clearly legal for members of a trade association to report such things as production, sales and prices to a governmental agency—for example, the Department of Commerce—there to be compiled into an anonymous form and then made public. Two intermediate cases remain to be discussed.

(1) Suppose members of a trade association voluntarily send to its central office daily reports showing total sales, average prices, production and stock on hand, without identifying their individual transactions. Suppose the central office compiles these reports and distributes to members and to the public a statement of totals without identifying the members reporting. If the identity of neither the reports compiled nor of the transactions reported is in any case disclosed, will this arrangement support an inference of a purpose and an understanding "to restrain trade" as already defined?

(2) Suppose the arrangement is that just stated except that, instead of using the central office of the association for this purpose, an independent bureau or trade journal is employed. Is this arrangement illegal?

The difference between case 1 and case 2 is one going merely to the question as to the adequacy and reliability of the measures taken to prevent disclosure of details as to the individual's business and his transactions. It is clear that introducing an outside agency is a further safeguard and makes the inference of a purpose and an understanding to restrain trade more violent, but it is not believed that this is the only way to provide ample safeguards. We may therefore confine our discussion to case 1.

It is believed that a case disclosing the facts stated and no more facts than those stated will not be held to be a violation of the Sherman act. Such an arrangement, if carried out honestly and prudently, offers no opportunity to competitors to farm out among themselves territory, customers or competing lines. These consequences would not follow and would therefore offer no basis for an inference of an agreement to bring them about. Such leveling of prices as might result would come from the competitors' independent judgments in the light of general conditions.

It is clear that there is no judicial authority for saying that such an arrangement would be illegal. Indeed the Supreme Court in the Linseed case said:

> We are not called upon to say just when or how far competitors may reveal to each other the details of their affairs. In the absence of a purpose to monopolize or the compulsion that results from contract or agreement, the individual certainly may exercise great freedom. . . . The situation here questioned is wholly unlike an exchange where dealers assemble and buy and sell openly, *and the ordinary practice of reporting statistics to collectors* stops far short of the practice which defendants adopted.

An Important Distinction

A careful reading of the following from a letter written by the Attorney-General to Secretary Hoover, dated Dec. 19, 1923, is suggested:

> In my judgment the effect of general information as to the conditions of an industry, such as the total production, shipments, stocks on hand and the average price, or range of prices, *is entirely different from that resulting from each person engaged in an industry receiving directly or through a common medium reports which reveal to him the exact condition of the business of all of his competitors.* When thus informed, each one is invited and is naturally inclined to imitate the conduct of his most successful competitor; and the spirit of comradeship created by the confidential exchange of information of this character necessarily prevents the free competition between them which would otherwise prevail. . . .
>
> I have no doubt that it is important that those engaged in an industry have general information as to the conditions of that industry, but I think that that information should be distributed *strictly through a responsible agent, like your department;* and I see no objection to its being gathered by an association, *provided it be strictly guarded and the association be prohibited from distributing it among its membership.*

Adding the qualification that "the association be prohibited from distributing it [general information] among its membership" is proper caution when it comes to committing the prosecuting department of the government in advance of possible prosecutions, but it is believed that the distinction drawn in the first paragraph quoted will mark the limits of the Supreme Court's position on this question when it comes to decide the matter. It is difficult to believe that the courts will hold no private agency competent honestly to perform the function of compiling and publishing general information.

This conclusion is based upon the assumption that no other facts appear to the contrary of those supposed. Of course, if there be added to the facts of our hypothetical case some of the numerous circumstances calculated to excite suspicion of an illegal purpose, the inference of an agreement to restrain trade, as already defined, would be justified, and those who have read the cases know that we may confidently rely upon our courts to draw that inference.

Legal Notes

By Wellington Gustin
Of the Chicago Bar

Care in Manufacture of Explosives

Expert Evidence of Hudson Maxim Cinches Case Against Company Calling Him to Determine Distance at Which Explosions Cause Damage

The degree of care required in the manufacture of high explosives is considered in an action at law for damages instituted by Bernard Benson against the Atlas Powder Co. and decided in the United States Circuit Court of Appeals against the company. (287 Federal 797.)

It appears that an explosion occurred in the plant of the Atlas Powder Co. at a place where nitroglycerine and an absorbent material were being mixed as the final operation in the manufacture of dynamite. Benson's building, situated about five-eighths of a mile away, was damaged, and he brought this action, charging, first, negligence in the operation of the plant, and second, the maintenance of a nuisance.

At the trial plaintiff proved only the occurrence of the explosion and consequent damage, and rested his case. The company moved for a non-suit on the ground that plaintiff had not proved by affirmative and positive evidence that the explosion was due to its negligence. The court held that plaintiff made out a *prima facie* case of negligence by invoking the doctrine of *res ipsa loquitur*—i.e., the thing itself speaks.

Maker Must Exercise Caution

That high explosives have become a commercial necessity and serve important public interests and that their manufacture is now regarded as legitimate business does not relieve a manufacturer of the duty to exercise proper care, commensurate with the dangerous character of the business, in the operation of its plant, and does not absolve it from liability from failure to do so, nor from the application of the doctrine of *res ipsa loquitur*, where it would otherwise be applicable, says the Court of Appeals. And in arriving at this opinion the court considered the dangers inherently incident to their manufacture and the difficulties of guarding against them. The dangerous character of its output does not relieve the manufacturer from the duty of exercising care and caution in operating its plant according to the rule.

The definition of the doctrine of *res ipsa loquitur*, as applied by the court, is:

"When the thing is shown to be under the management of the defendant or his servants, and the accident is such as in the ordinary course of things does not happen if those who have the management use proper care, it affords reasonable evidence, in the absenec of explanation by the defendant, that the accident arose from want of care."

The court held that in this case all the essentials of the doctrine were present and that in its application the plaintiff made out a *prima facie* case. But this evidence may be rebutted, and availing itself of this phase of the doctrine, the defendant introduced evidence tending to show that its method of making dynamite was in quantities of 1,000 lb. at stated intervals, mixed in well-tried machinery, and that its machinery and method were the usual ones employed in the industry and therefore were proper. Further, the defendant company did not attempt to show the cause of the explosion—all the men present having been killed—but called a workman as a witness, who, having a few minutes before removed the last complete batch, said that when he was in the mixing house there was no dynamite in process of mixing; there was nothing to indicate an impending explosion; and the men were not violating any of the rules or otherwise doing anything they ought not to do.

Within Legal Distance for 1,000 Lb.

Now, on the issue of nuisance the plaintiff was satisfied to prove only the distance of his building from the plant. Defendant moved for judgment on this point for the reason that plaintiff had failed to show that the plant was a nuisance *per se*. At one time in New Jersey the keeping of gunpowder, nitroglycerine and other explosive substances in larger quantities was regarded a nuisance *per se*, but this rule is now changed, and whether the keeping of high explosives in large quantities is or is not a nuisance depends upon the locality, the quantity and the surrounding circumstances. Moreover, the New Jersey Legislature has recognized that under certain circumstances the manufacture and storage of high explosives are lawful, and has made certain requirements which, when observed, take the manufacture and storage of explosives out of the class of nuisances. The New Jersey Penal Law of 1911, page 497, says:

"No person shall manufacture, have, keep or store explosives except in compliance with this act."

The act then gives a "quantity and distance table" showing the quantities of explosives which may lawfully be made or kept within given distances from buildings owned by others. The figures of this table show that from 1,000 to 1,500 lb. may lawfully be kept within 1,060 ft. of the building of another. Now the defendant maintained that because of its method of manufacture there was but 1,000 lb. in the mixing house at the time of the explosion. Since it could lawfully have this quantity within 1,060 ft. of a building owned by another, and as plaintiff's building which was injured by the explosion was five-eighths of a mile distant, it claimed it was well within the statute protecting it from the charge of maintaining a nuisance.

Maxim Upsets Contention

In an endeavor to bring itself within the New Jersey statute the defendant produced Hudson Maxim, noted expert on explosives, who testified that if the quantity of dynamite which explodes was only 1,000 lb., as contended by the defendant, the structural damage from the explosion was limited to a distance of 530 ft., and that in calculating quantities of dynamite which upon exploding would produce structural damage at greater distances, "you multiply your quantity of explosive by 8 every time you double the distance." Now the court says since plaintiff's building was admittedly injured by the explosion, and as it was about 3,200 ft. away, the defendant company, by this testimony, clearly strengthened the plaintiff's case on the question of the quantity of dynamite being manufactured, and on the issue of nuisance.

Judgment against defendant was affirmed.

Pulverizing Fertilizer Ingredients

Practical Discussion of the Grinding Problems Which Are Encountered by All Types of Plants in the Fertilizer Industry

By L. H. Sturtevant
Vice-President, Sturtevant Mill Co., Boston, Mass.

FERTILIZER plants are roughly divided into three types—those manufacturing acid phosphate and making complete fertilizer, those making acid phosphate only, and those that purchase practically all of their ingredients, and mix only. There are also plants that supply prepared materials for the fertilizer manufacturer, ready to use.

In this article, the description of pulverizing machinery will include all of the grinding operations pertaining to such plants.

Prior to the discovery of large sulphur deposits in the South, most sulphuric acid was manufactured from Spanish pyrites, and this material is used to some extent at present in this country and almost universally abroad. The treatment of pyrites depends upon the kind of furnace used.

Pyrites Crushing Problems

As pyrites is hard, it requires a heavy duty machine to crush it satisfactorily, and as a uniform product is wanted, a special type of crusher is generally preferred. These crushers differ from the ordinary type of jaw breaker in that the moving jaw is pivoted below and well back in the frame; thus the greatest motion to the jaws is at the intake or top instead of at the discharge, as in most crushers. This gives the moving jaws a downward motion with comparatively little throw at the bottom, which insures uniformity of product. Hand-charged furnaces require 1- to 1½-in. ore with minimum fines, but when mechanical furnaces are installed, it is desirable to have the product much finer, but still uniform; therefore the jaws of the preliminary crusher are set closer to deliver a product about ¾ in. and finer, and by following with rolls, the crusher output is further reduced to from ¼ to ⅜ in. in size.

These rolls are of the regular mining type, built on the balanced principle—that is, having springs back of all four bearings—so that the crushing shocks are reduced to a minimum, and as these springs are so stiff that they compress to give relief only under breaking pressures, its product is of a very even character, without excessive fines.

As stated above, sulphur has practically displaced pyrites in this country, as it is not only easier and less expensive to burn but at the present time is cheaper to purchase, and requires no crushing.

Acid phosphate, the base of most fertilizers, is made from phosphate rock dust mixed with sulphuric acid, which forms acid phosphate, and as practically equal proportions of rock to acid are used, the rock is ground in large quantities, and is the principal or major grinding operation of the fertilizer industry.

CRUSHING AND GRINDING

Do you realize that the disintegration of material—whether by crushing, grinding, pulverizing or cutting—enters into nearly every chemical engineering industry? Manufacturers of almost every heavy chemical, of fertilizer, ceramics, lime and cement, sugar, paper and coal products, paint and dyestuffs, all of them are faced with a problem in this field. Each can learn from the experience of the rest. What can you take into your plant from this story?

A UNIT PROCESS OF CHEMICAL ENGINEERING

Grinding Phosphate Rock

Phosphate rock comes from many localities in this and other countries, and varies greatly in physical characteristics. In this article only the Florida and Tennessee deposits will be considered, as they really form two extremes. In Florida, the rock comes in pebble formation, some very hard and others soft, varying in size from fine sand to large pebbles, while Tennessee rock comes in lumps, and is generally softer than the Florida rock. As extreme fineness of grinding is necessary, it is desirable to keep the moisture content low; therefore it should not be exposed to the weather, either in shipment or in the plant. Much of the Florida rock is fine and requires no preliminary crushing preceding pulverization, but the lump variety must be crushed before being ground. As many plants use both grades of rock, it is customary to make provision for preliminary crushing, either as the rock is unloaded from boat or cars or as it is conveyed to the pulverizing unit.

There are two forms of crushers used for this purpose, the most popular being the rotary type, Fig. 1, which takes rock from 6 to 8 in. cubes, and reduces it in one operation to 1 in. or to ½ in. and finer, depending upon the type of pulverizer used. These crushers are really large coffee mills, having a vertical revolving shaft upon which crushing members are placed. Surrounding this shaft is a heavy hinged case, which is lined, and as the shaft revolves it crushes the material gradually between moving and stationary members until it is discharged at the bottom of the size desired.

Where head room is limited, as beneath track hoppers, a lower type of mill is desirable, and for such purposes the swing sledge mill, Fig. 2, forms a convenient means of preliminary breaking. This mill is of the heavy high-speed hammer type which takes in practically any size rock, and the fineness of product is regulated by the grate spacings at the bottom of the mill case. For this class of work the mill is not run at its usual high speed, and therefore proves a durable, practical and convenient device, with its "open door" accessibility, for preliminary reduction.

When the crushed rock is delivered to the grinding unit, it is generally placed in a bin over the pulverizer,

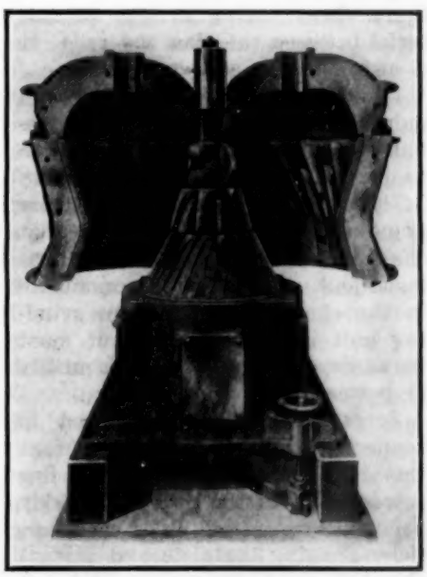


Fig. 1—Rotary Crusher

from which it falls by gravity into the mill. The pulverizer discharges into an elevator, which carries the partly ground product into an air separator, the fines passing to the rock dust storage, while the tails, or oversize, fall by gravity back into the mill for further reduction.

Several kinds of pulverizers are employed for this purpose, but the most popular is the ring and roll type, Fig. 3, which is almost universally used. This machine has a revolving ring, upon the inner concave surface of which the material is fed and held thereon by the centrifugal force generated by the ring's rotations, to a depth of ½ to 1½

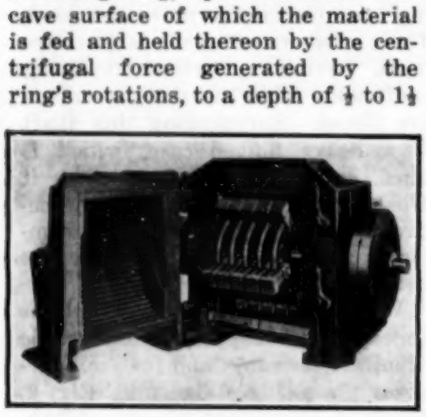


Fig. 2—Swing Sledge Mill

in. Against this layer of material three rolls, driven by friction against the layer of material, are strongly pressed by springs. The crushing is by pressure, the pulverized rock falling from either side of the ring, through the bottom of the mill case into the elevator. This machine's popularity may be attributed to such factors as its slow speed, small power, simplicity, large output, accessibility, being of "open door" construction, its unusual durability, because its wearing parts are not in contact, there always being a layer of material between the ring and rolls. It is also noiseless and dependable.

It is very necessary to install a pulverizing unit that is absolutely reliable and that may be counted upon to operate continuously, if necessary 24 hours per day, during the entire grinding season, for the reason that the acid must be used as fast as made and not allowed to accumulate in the chambers. Thus the grinding unit in a fertilizer plant must be as dependable as a public utility or power plant.

Screens were formerly used in connection with these mills, but as this rock is ground to a very fine powder, so that the acid will quickly penetrate to the center of each particle, allowing complete and instant chemical reaction, screens did not prove reliable, as when worn or punctured, they would let coarse material through; also when the rock was a little damp, blinding of the meshes would result, lowering the capacity and causing fines to pass back to the pulverizer, greatly decreasing its efficiency. With air separators these troubles have been eliminated, as no ordinary amount of moisture affects them, wear and tear is practically nil, power low and little attention is required.

Elevators working in connection with this unit should be equal in quality to the other machines, and should have "open door" accessibility to make the work of replacement quick and easy. A dust-collecting system is also desirable, as it not only keeps the plant clean but saves values in dust that otherwise are lost.

A plant of this type, having a capacity of from 6 to 7 tons per hour, costs approximately $15,000 complete, requires about 85 hp., and will grind from 25,000 to 45,000 tons of rock without major repairs. It is generally figured that the upkeep amounts to about 2½c. per ton, and one operator is sufficient to run it. This unit is of standard size, and should greater capacity be needed, duplicate units are installed. The fineness of grinding of phosphate rock varies somewhat according to individual practice, but it is seldom coarser than 90 per cent through a 60-mesh screen, and rarely finer than 95 per cent through a 100-mesh screen, and perhaps the average is 90 per cent through 80-mesh.

The other ingredients used in a fertilizer plant to make complete fertilizer are of almost infinite variety, and are selected for their ammonia or nitrogen, phosphorus, potash or potassium content; therefore practically anything that contains these elements and can be purchased at a reasonable price may be used—bone, blood, tankage, fish and leather scrap, cottonseed meal, tobacco stems and a variety of chemicals, such as ammonium nitrate, ammonium sulphate, acid phosphate, cyanamide, kainite, muriate of potash, nitrate of soda, etc.

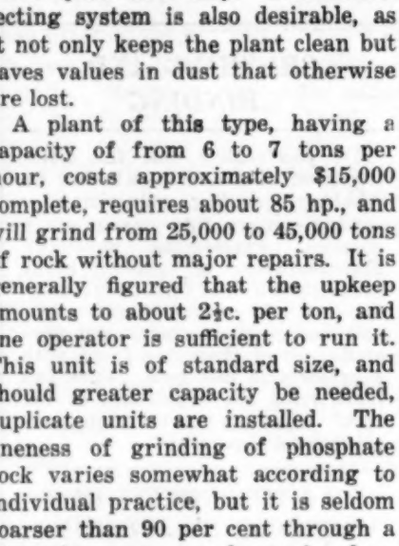


Fig. 3—Ring and Roll Pulverizer

A large number of these materials require pulverizing, while some do not, but when used in complete fertilizer all must be of a fineness of at least 6 mesh, so that they may be applied to the soil through the ordinary farmer's drill.

Many fertilizer manufacturers purchase these materials in prepared form, others use some ground ingredients and pulverize the remainder, while still others grind all of their products. Some manufacturers install special equipment for pulverizing and sizing these varied substances, but many depend upon this reduction in the mixing units. There are some concerns that specialize in grinding and supplying to the fertilizer manufacturer such materials as bone of various kinds, fish scrap, tankage and similar materials.

Pulverizing Mixed Fertilizer Ingredients

As most of these materials are fibrous, damp, scaly, tough or sticky and have become caked, practically one type of pulverizer is used for the reduction of all. Under such conditions it is necessary to have a very free discharge from the pulverizer, and therefore the sizing is generally done over a screen. The high-speed beater type of hammer mill or the cage mill is in almost universal use for this purpose, as these machines are adaptable to varying conditions. In the former machine, when grinding difficult materials, it becomes necessary to omit the grates entirely from the bottom of the mill; with others grates are placed only half way round, while with dry, free-discharging materials, the regular spacings are used. The hinged hammer machine, Fig. 4, if of "open door" construction, may be adjusted for preparing practically any of these materials, and gives minimum trouble. Again, almost all fertilizer ingredients, with the exception of the chemicals, contain a great deal of tramp iron, and as few concerns use magnetic separators, the machine

pulverizing this material should have some relief to prevent breakage. With the swing hammer or swing sledge type of machine, the hammers, being thrown out by centrifugal force, are free to give back in relief, when uncrushable material is encountered, and discharge such material without serious injury to the mill. Cage mills do practically equal work, yet when iron enters, it makes a wreck of the machine. For this reason, for general work they are not as desirable as the flexible hammer type. A third machine, called a slicer or knife, is sometimes used. This consists of a series of fixed hammers revolving through a flexible or spring hopper, so that when uncrushable material enters the machine, the sides of the hopper are forced back and allow the iron to pass through.

The remainder of the grinding unit, when any of these machines is used, consists of an elevator, and a screen that removes the material already fine enough and returns the oversize for regrinding.

In the mixing and shipping unit the same class of pulverizer is used, for while in this case some of the materials have been previously prepared, yet they have been placed in storage, have accumulated moisture and come to the unit in more or less lumpy condition, requiring repulverizing. In this case, as these units handle large tonnages and work on the batch method, usually from 1 to 2 tons at a charge, this material is fed directly into the elevator and passes over the screen. The fines are accumulated in the mixer hopper, and the oversize only goes to the pulverizer, where it is quickly reduced, again passes up the elevator, over the screen, and rejoins the batch from which it was extracted. Then the entire batch goes into the mixer; otherwise the tailings of one batch would accumulate in the next, and the mixture would not be correct. As above stated, many manufacturers depend upon these mixing units for pulverizing as well as mixing and in that case the outputs are somewhat reduced.

Three kinds of screens are used—the old-fashioned revolving kind, usually hexagonal in shape; the equally antiquated bumping screen, and the more modern vibrating screen. As the fiber in the various ingredients used has a strong tendency to adhere to the wire meshes, it is most advantageous to have these machines of a quickly accessible nature, so that they may be kept clean by brushing. If the screens are of open construction, the plant is very dusty; if closed, they should have an open door cover, to allow for immediate inspection and brushing. These materials are by no means easy to screen, even as coarse as 6 or 8 mesh, and therefore such machines require intensive vibration or bumping to overcome these difficulties.

Limestone is popularly known as a fertilizer, but in reality is a soil sweetener; nevertheless this article would be incomplete without including it in the list of fertilizer materials needing to be pulverized.

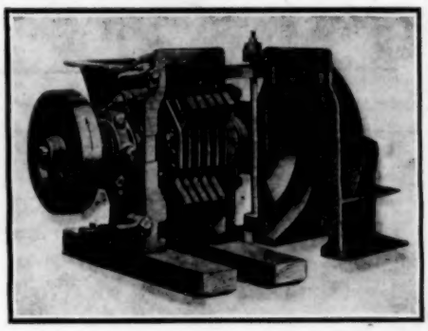


Fig. 4—Hammer Mill

There are several methods employed to do this work, the first being the ring and roll type of machine, such as described for reducing phosphate rock, but as limestone does not require such fine pulverization, screens are used in place of air separators. The usual requirement for direct application to the soil is a fineness of 90 per cent passing a 20-mesh sieve, although some users require it to be as fine as 95 per cent through 100-mesh, in which case the same plant is used, only the air separator is substituted for the screen. A second method is to employ the swing sledge type of mill, which will deliver its product direct, without screens, but is limited to the coarser products.

When the ring-roll type of plant is used, a preliminary crusher, reducing to 1½ to ¾ in. size, according to the size of mill, is necessary. With the swing sledge mill, from 2 to 4 in. is fine enough, and in fact the larger sizes of these machines will take in man-sized rock.

Gypsum and marl are also used to some extent, as is also feldspar for its potash content. There are other rock fertilizers of a special nature, that are made by a few manufacturers, and all such materials may be handled in either the ring and roll type of pulverizer or the swing sledge mill.

Basic slag is used to a considerable extent abroad. As it contains a great deal of iron, it is a very difficult material to pulverize to the fineness required by the fertilizer manufacturers, which is approximately 80 per cent through 100-mesh. Plants generally preferred abroad consist of a jaw crusher, reducing to 1-in. size, followed by a ball mill, crushing to about ¼-in. size, which at the same time separates the iron from the slag. The product from the ball mill passes to a ring-roll mill, thence over screens or air separator, the oversize returning to the ring-roll mill for regrinding. This makes a very efficient and durable plant for this severe duty.

Adsorption Theories

Probably the best authenticated hypothesis concerning adsorption is advanced by Freundlich ("Kapillar Chemie"), who considers that in the phenomenon referred to as adsorption the free layer of the solution possesses a concentration differing from the body of the solution; that where adsorption is possible the change in concentration always takes place with a resulting great decrease of the surface tension; and that if the latter is decreased in the solvent by an increase in the concentration of the dissolved substance, the latter will try to concentrate in the surface layer.

Gurwitsch ("Wissenschaftliche Grundlagen der Erdölbearbeitung") is of the opinion not only that adsorption is primarily a physical process but also that in certain cases it is accompanied secondarily by purely chemical processes such as polymerization of unsaturated hydrocarbons. Morrell and Egloff (*Refiner & Natural Gasoline Manufacturer*, 1923, vol. 2, No. 9) likewise believe that fullers earth exerts a chemical as well as a physical effect in refining, particularly in the purification of cracked hydrocarbon oils. Day recommends that a quantitative study of the pure hydrocarbons of different series be made in order to show their relative adsorptive capacity, for the difference between the capacities of the various constituents to concentrate on clay surfaces is so great that it is possible to remove practically all of certain constituents from solution (or colloidal suspension) in the other oils of the mixture.

Equipment News

From Maker and User

Controlling Temperature Electrically

New Contact Type Instrument Permits the Range to Be Varied—Used With Electric Heaters

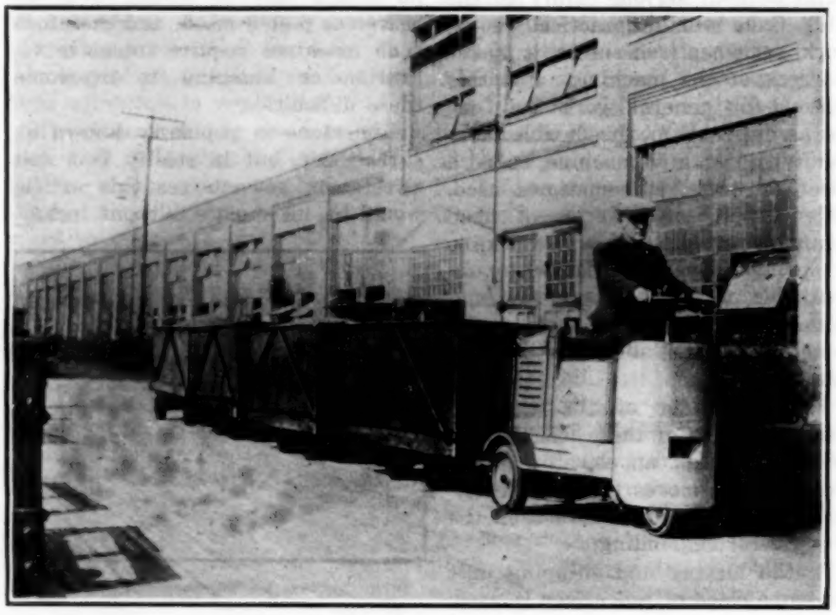
The C. J. Tagliabue Manufacturing Co. announces the addition of an electric contact-type temperature controller to its line of indicating, recording and controlling instruments. This electric contact controller consists essentially of a dial-indicating thermometer, the pointer of which is actuated by the usual mercury, vapor-tension or gas-filled thermostatic system, depending on the desired range and other specifications. The bulb stem is inserted in the oven, furnace tank or other apparatus where the temperature is to be controlled and is connected by a capillary tube to the case, which can be mounted at any convenient location. As the temperature at the bulb increases or decreases, the thermostatic spring uncoils or recoils, thus moving the pointer across the scale. The exact temperature existing at the bulb is thus indicated at the case and the responsiveness and closeness of the control may be determined.

The temperature is controlled by the following arrangement: On each side of the indicating pointer is located an arm. These arms are mounted on the axis of the pointer and have mounted on them auxiliary contactor arms. By adjusting the left-hand arm to point to the minimum temperature and the right-hand arm to point to the maximum temperature, control is established between these two points in the following manner. When the indicating pointer reaches the minimum temperature, its contact block makes an electric contact with the left-hand arm, closing a circuit through binding posts *L* and *C*, which operate through a relay to close the circuit of an electric heating coil. The current continues to pass through this heating coil until the indicating pointer reaches the maximum temperature and makes an electric contact with the right-hand arm, closing a circuit through binding posts *C* and *H*. The controller may also be used for starting and stopping a motor by means of a motor-starter as in the case of an automatic refrigerating unit.

The least difference between minimum and maximum control temperatures is approximately $\frac{1}{2}$ in. It cannot be expressed in degrees of temperature unless the range of the scale is known. An adjusting screw is provided for simultaneously lowering or raising the minimum and maximum temperatures at which the indicating pointer closes the circuit. This is accomplished by moving the arms together as a unit to the right or left. The difference between the minimum and maximum temperatures may be changed by turning the adjustment screw provided within the case. This is accomplished by having the left contact arm move toward or away from the right contact arm. The greatest difference between minimum and maximum control temperatures is approximately one-half of the total temperature range of the dial.

Head temperature correction is provided. By means of a bimetallic strip interposed as a link between the spiral spring and the spindle of the indicating pointer, fluctuations in temperature at the case of the instrument are corrected automatically.

Electric Temperature Controller



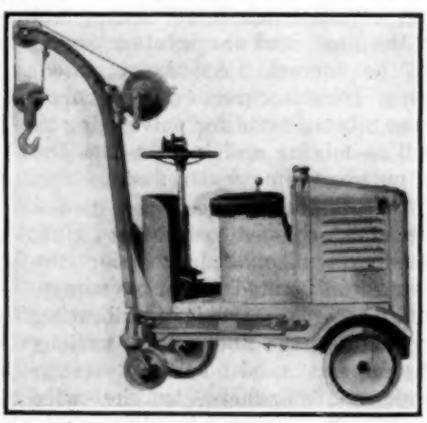
Gasoline Tractor Towing Trailers

Gasoline Factory Vehicle

Unit Which Can Be Used as Tractor, Truck or Crane Promises Utility in Many Fields

A new industrial haulage vehicle, driven by means of a gasoline engine, has recently been placed on the market by the Clark Tructractor Co., Buchanan, Mich. This machine, called the "Duat," is a three-wheeled tractor which can be used as a truck and to which a crane attachment can be affixed. The turning radius is only 52 in. and it can pivot on one wheel, thus being turnable within the ordinary box-car.

When used as a tractor, this machine will pull up to 10 tons and a maximum of twenty trailers. The wheels are 16 in. in diameter and have 3½-in. solid



Removable Crane in Place on Duat Tractor

rubber tires. The wheel base is 40 in. and the tread 40 in. A brake is provided attached to the driver's seat in such a manner that, when he dismounts, the car automatically stops. This is a safety feature in addition to the regular brake.

The crane attachment can be attached in a short time without the use of tools. It has a lifting capacity of 2,000 lb. The crane brake permits the load to be stopped and held at any height up to 56 in.

This machine has been designed for the loading and unloading of box-cars, for lifting and towing loads through narrow factory aisles and for interplant haulage.

Air Preheating for Furnaces

New Type of Equipment to Extract Heat From Waste Gases for Preheating Combustion Air

Last August we noted in these columns one of the first air preheaters to be marketed in this country. This system has had more ready adoption abroad because of the conditions there existing than it has in this country; but new developments here—particularly the bleeding of turbines in power-generating plants for purposes of heating boiler-feed water—have recently made the situation more favorable for preheaters as against economizers.

The most recent type of this apparatus to be placed on the market is the "CEC" air heater, made by the Combustion Engineering Corporation of New York. This device is of the plate type, as shown in the accompanying illustration.

It consists of a steel casing in which

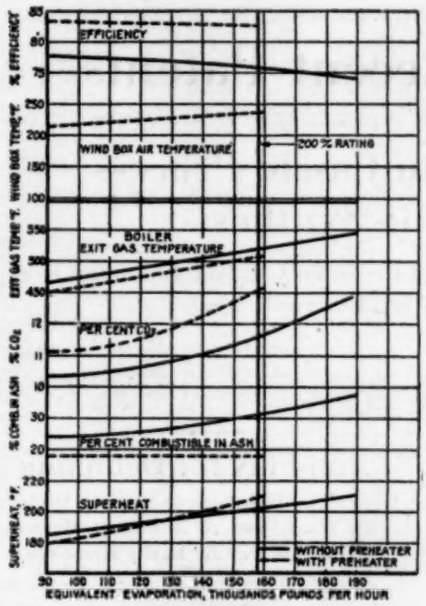


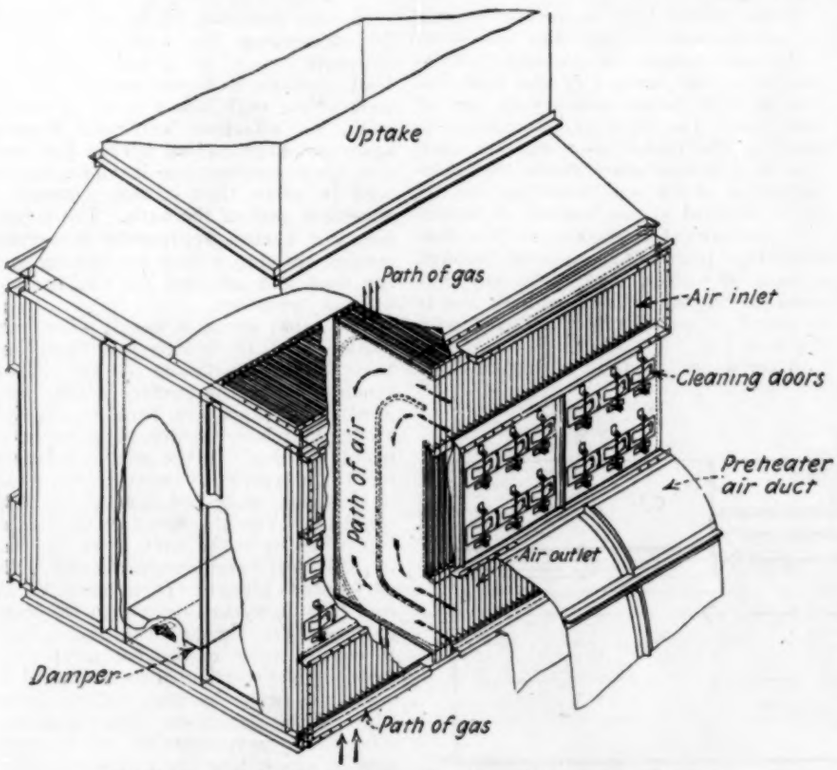
Chart of Comparative Results, With and Without Air Heaters

are contained a number of steel plate elements spaced 1¼ in. apart. The two plates constituting each element are spaced 1 in. apart. The gas and air are divided into alternate parallel streams which flow in opposite directions to each other—that is, assuming that the gas passes from the lower to the upper part of the heater, then the air will be drawn in at the top and taken out at the bottom. Obviously the steel plates are hottest at the point where the flue gases enter and as the gases pass along there is a decreasing amount of heat available for absorption. As a result of this counter-flow principle, the air, entering at the point from which the gases leave, encounters an increasing temperature as it progresses through the heater and consequently absorbs the maximum amount of heat. The temperature difference between gas and air is thus maintained at a practically constant ratio.

Inasmuch as these parallel streams of gas which pass over the air elements are only 1¼ in. in depth, it is evident that practically all the gas is brought into immediate contact with the surface of the elements. This condition is also true of the air, which is divided into parallel streams 1 in. in depth. Because of the fact that the streams of gas and air alternate, both plates of the element are brought into contact with the hot gas. This complete contact of both gas and air with the same heating surfaces results in a most effective transfer of heat. By eliminating the natural tendency of the gas and air to stratify, the heat transfer is uniform throughout the surface of each element.

The spacing within the air elements is obtained by the use of several 1-in. angles which are suitably secured to one of the plates and act as both spacers and baffles. These angles are so located as to distribute the air over the surface of the plate and to prevent any tendency toward short circuiting through the portion of the element where the length of travel is shortest. To the outside of each element are affixed a number of 1¼-in. angles which act as spacers for the gas passage between elements. The two plates which make up an element are secured together in such a way as to make a gas and air tight envelope. This prevents air leakage into the gas passage, which would lower the efficiency of the heater.

In the making up of a complete heater, the required number of elements are assembled side by side and inclosed in a steel plate casing suitably braced throughout and provided with flange connection on the inlet and exit gas and air openings for connection to the air ducts and flues.



Double Bank Type Air Heater as Installed at Duquesne Light Co.

Catalogs Received

THE GRISCOM-RUSSELL CO., 90 West St., New York City—Bulletin 1216. Booklet describing the "U-fin" air cooler, which is an apparatus for cooling the air from generator windings by means of the turbine condensate. This is claimed to conserve a portion of the heat in the air from the generator by heating up the condensate water.

ATMOSPHERIC CONDITIONING CO., Philadelphia, Pa.—Bulletin 60. A catalog on the Webster type of spiral spray nozzle, which is designed for use with air-conditioning equipment and for other purposes. The bulletin also describes the use of this nozzle in various layouts of air-conditioning apparatus.

THE THERMO ELECTRIC INSTRUMENT CO., Newark, N. J.—A new pamphlet describing the "Freas" type of conditioning oven. This is a drying oven so arranged that materials carrying moisture may be weighed therein after they have been made bone-dry, thus aiding in determining the true weight of many materials which normally carry a varying amount of moisture.

C. H. COWDREY MACHINE WORKS, Fitchburg, Mass.—A folder describing the plant and some of the special machines made, such as wrapping machinery.

ROLLER-SMITH CO., 233 Broadway, New York City—Bulletin 400. Catalog of direct current switchboard instruments, including ammeters, milliammeters, voltmeters, millivoltmeters, voltammeters, of two types—i.e., 3½-in. and 4-in. diameter.

Review of Recent Patents

Improvements in Casale Process for Ammonia Synthesis

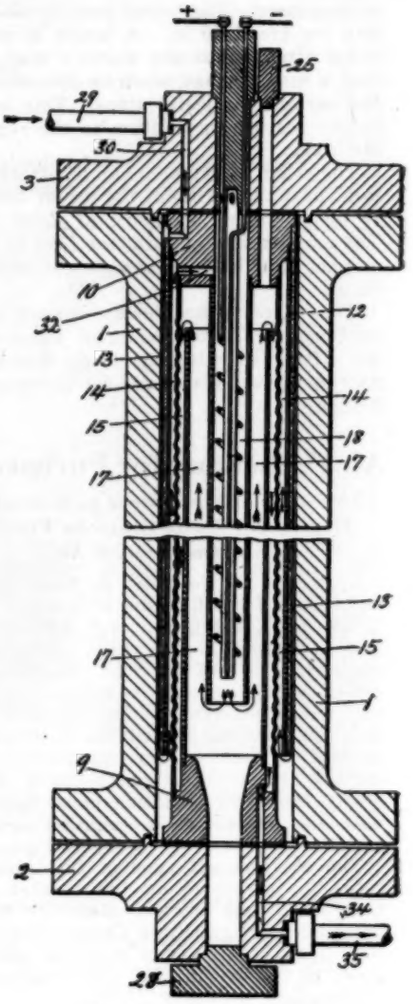
Heat-Interchanger Inside of High-Pressure Catalyst Chamber Prevents Overheating of External Walls

LUIGI CASALE discusses improvements in his apparatus for ammonia synthesis in Patents 1 478,549 and 1,478,550, granted Dec. 25, 1923, and assigned to Casale Ammonia Co., of Lugano, Switzerland. The accompanying figure shows the apparatus disclosed in Patent 1,478,550, which is an improvement over Patent 1,478,549 as well as Patent 1,408,987, issued March 7, 1922.

As shown, the apparatus consists of a flanged pressure tube 1, closed at the ends by caps 2 and 3. Plugs 9 and 10, also held in place by caps 2 and 3, support a series of tubes which form a heat-interchanger. The action of this is best understood by following the course of the gas mixture through the apparatus. Through tube 29 and passage 30 the nitrogen-hydrogen mixture reaches the annular space 13 between the shell 1 and the tube 12. It then passes up the second annular space 14 and through passage 32 to chamber 18, which contains the heating element. The heated gases next pass over the catalyst in chamber 17 and out through space 15, passage 34 and tube 35 to the ammonia coolers and condensers.

By thus placing the heating elements in the center of the tube and in addition interposing a heat-interchanger between the source of heat and the inside wall of tube 1, the latter is exposed only to the temperature of the incoming gases. As this is always considerably less than 400 deg. C., there is no danger that the compressed hydrogen will deteriorate the steel and render it unserviceable.

Certain additional advantages are also embodied in this design. The electric resistance element can be removed without disturbing the connections by which the gases are supplied to the device and without removal of the catalyst. Furthermore, by means of plugs 25 and 28 it is possible to change the catalyst without disturbing either the heating element or the gas connections.



Casale Ammonia Bomb

Anti-Flux for Detinning

Under the Influence of Sodium Hydroxide Tin Ceases to Adhere to Heated Iron and May Be Easily Removed

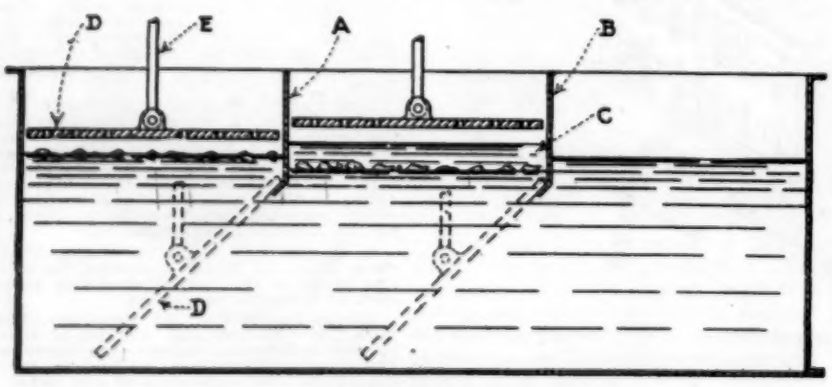
John S. Morgan, of London, England, describes a unique process for detinning iron in American Patent 1,479,731, granted Jan. 1, 1924, and assigned to a British firm, Thermal Industrial & Chemical Research Co., also of London.

He points out that in the original tinning operation, in order that the molten tin or alloy may adhere to the iron immersed in it, the iron sheet must be treated with a suitable flux before it is immersed. This preliminary treatment alters the surface tension relationship so that the tin spreads evenly over the iron and adheres to it. Morgan has found that certain substances have an effect the reverse of that of the flux, in that instead of causing the tin to spread over and adhere to the iron they cause it to refuse to wet the iron. Such substances may conveniently be termed "anti-fluxes."

When tinned iron is suitably heated in contact with an anti-flux, the metal melts and collects in globules distributed over the surface of the iron, but having little or no tendency to run off the iron. The invention consists in treating the tinned iron with an anti-flux at a temperature above the melting point of tin and removing the tin by a physical or mechanical operation. The mechanical operation in this case consists of passing the material through a bath of molten lead. The tin thus remains substantially unoxidized and is removed in metallic form alloyed with the lead.

A convenient method of applying the invention described by Morgan consists in submerging the material, such as tin-plate scrap, in a bath of molten lead, causing it to emerge at another part of the bath into a layer of caustic soda, an effective anti-flux, floating upon and kept melted by the hot lead, and then submerging it again in the lead in order that it may emerge at a certain part of the bath. The accompanying sketch represents a vertical section through a tank containing molten lead and adapted for the practice of this invention.

The tank, which is nearly filled with molten lead, is divided into three sections by the partitions *A* and *B*, extending below the surface of the lead. These partitions are bent to the left along their lower edges at an angle of about 120 deg. In the middle compartment is a layer *C* of caustic soda, which is kept molten by the heat of the molten lead. The tin scrap to be heated is thrown upon the surface of the lead in the left-hand compartment. The perforated plunger *D* pivoted to its rod *E* is now run down into the compartment and through the molten lead. It carries with it the tin scrap in a more or less vertical direction until its edge is caught by the inclined lower edge of the partition. The continuous downward movement of the plunger now brings it into the inclined position shown by the dotted lines, and the tin



Detinning Process

scrap slides upward along the under surface of the plunger and emerges from the molten lead into the layer of caustic soda. A similar plunger is now thrust downward through the caustic soda and molten lead to carry the tin scrap back into the bath. This plunger acts in a way similar to that of the first one, and the tin scrap slides upward along it into the right-hand compartment, where it floats on top of the lead and is removed in detinned condition. The lead bath is, of course, gradually enriched in tin and may eventually be treated metallurgically for recovery of this metal.

Caustic soda has been used before in detinning processes, but it has been used as a chemical reagent and not for its physical effect on surface tension relationships. Other hydroxides and many metal salts may also be used.

Readers' Views and Comments

An Open Forum for Subscribers

The editors invite discussion of articles and editorials or other topics of interest

Economies of Labor-Saving Equipment

To the Editor of Chem. & Met.:

SIR—On p. 1153 of your Dec. 24, 1923, issue C. O. Sandstrom comments on the formulas proposed by the Materials Handling Division of the American Society of Mechanical Engineers for computing economies of labor-saving equipment.

The criticism apparently does not apply to the mathematics of the formulas, but to the choice of language used in defining the factors *S*, *T*, *U* and *E* and seems to hinge upon the meaning of *"yearly savings,"* as employed in describing each of the before mentioned factors. Mr. Sandstrom suggests as a correction the substitution of *"rate of yearly saving,"* if these factors are to be given a value intended to cover all of the working days of an entire calendar year and thus become subject to modification by the factor *X*, where operations are in actual practice not continuous throughout the year.

The Century Dictionary defines the word "yearly" as follows: (1) "Annual happening, occurring or coming every year." (2) "Lasting or continuing for a year."

The first definition appears to refer to the word "yearly" as applied to a series of years, hence we must revert to the second definition for its meaning when applied to a specific year.

"Lasting or continuing for a year," when applied to the formulas, would seem to require that the factors *S*, *T*, *U* and *E* should be given values for a full year at the daily, weekly or monthly rate at which a total for the full year would accrue, after which, if the operations affected are in practice conducted for a portion of the year only, modification by the factor *X* will reflect the exact facts.

The word "rate" is defined as follows: "A reckoning by comparative values or relations; proportional estimation according to some standard; relative amount, quality, range or degree." From this we may reasonably conclude that the word "rate" is applicable only where it is desired to refer to some sub-division of a unit or whole.

As used in the formulas, the expression "yearly saving" is intended to indicate the prospective saving within a full year. If in practice the instrumentalities which effect the saving are operative for a part of the year only, then when modified by the factor *X* the rate of saving which may be realized through a series of years is indicated.

A number of qualified persons have been consulted as to the interpretation

American Patents Issued January 15 and 22, 1924

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests, and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,480,673—Device for Regulating the Air Supply to Furnaces of Steam Boilers. Siegfried Deutsch, Vienna, Austria.

1,480,706—Forgeable Alloy of Iron and Nickel. Trygve D. Yensen, Swissvale, Pa., assignor to Westinghouse Electric & Manufacturing Co.

1,480,767—Pulverizer. Otto A. Kreutzberg, Lake Bluff, Ill.

1,480,807—Lithopone and Process of Making the Same. Edward C. Holton, Olmsted Falls, Ohio, and Jay Clyde Owens, Chicago, Ill., assignors to Sherwin-William Co., Cleveland, Ohio.

1,480,843—Method for the Cold Spurting of Tubes and Thin-Walled Metal Pipes of Lead, Tin and Especially Aluminum. Fritz Singer, Nuremberg, Germany, assignor to Fritz Neumeyer A-G., Nuremberg, Bavaria, Germany.

1,480,846—Aluminum Alloy. Alfred von Zeerleder, Neuhausen, Switzerland, assignor to Aluminum-Industrie-Aktiengesellschaft, Neuhausen, Switzerland.

1,480,888—Apparatus for Producing Interaction Between Gases and Liquids. Charles H. Marshall, Crafton, Pa., assignor to Koppers Co., Pittsburgh, Pa.

1,481,003—Hypochlorite Composition. Ralph E. Gegenheimer, Niagara Falls, N. Y., assignor to Mathieson Alkali Works, Inc., New York, N. Y.

1,481,039-40—Manufacture of Hypochlorites. Maurice C. Taylor, Charles A. Gammal and Ralph E. Gegenheimer, Niagara Falls, N. Y., assignors to Mathieson Alkali Works, Inc., New York, N. Y.

1,481,088—Apparatus for and Process of Manufacturing Nitrogen Compounds From Carbides. Tsuneichi Fujiyama, Tokyo, Japan.

1,481,099—Sealing Means for Gas Holders. Konrad Jagschitz, Mainz, Germany, assignor to Maschinenfabrik Augsburg-Nürnberg A. G., Nuremberg, Bavaria, Germany.

1,481,107—Liquid-Bleach Apparatus. James H. MacMahon, Niagara Falls, N. Y., assignor to Mathieson Alkali Works, Inc., New York, N. Y.

1,481,116—Machine for Drying and Conditioning Material. Elwood B. Ayres and Thomas H. Rhoads, Philadelphia, Pa., assignors to Proctor & Schwartz, Inc., Philadelphia.

1,481,122—Apparatus for Treating Gases With Liquids. Alfred B. Cleworth, Hollinwood, England.

1,481,140—Method of and Apparatus for Carbonization or Destructive Distillation. Samuel McEwen, London, England.

1,481,197—Purification of Hydrocarbons. David F. Gould, Cornwells, Pa., assignor to Barrett Co.

1,481,218—Apparatus for Drawing Sheet Glass. Otto C. Miller, Charleston, W. Va., assignor to Libbey-Owens Sheet Glass Co., Toledo, Ohio.

1,481,221—Process for Separating Gas and Vapor Mixtures. Max Nuss, Hochston-the-Main, Germany, assignor to Farbwerke vorm. Meister Lucius & Brüning, Hochst-on-Main, Germany.

1,481,251—Humidity Controller. William G. R. Braemer, Cranston, R. I., and Joseph Armstrong, Malden, Mass., assignors to American Moistening Co.

1,481,291—Heat-Exchange Device. Thomas J. Kehoe, Toledo, Ohio, assignor to Willys-Overland Co., Toledo.

1,481,311—Method for Centrifugal Amalgamation and Precipitation of Gold and Silver. Wilbur H. Appleton, Spokane, Wash., assignor to Western Metals Co., Spokane.

1,481,326—Apparatus for the Manufacture of Acetic Acid. Howard W. Matheson, Shawinigan Falls, Que., Canada, assignor to Canadian Electro Products Co., Ltd., Montreal, Que.

1,481,327—Method and Apparatus for Distributing Liquids. Henry R. Merseles, Bronxville, N. Y., assignor to Herbert E. Merseles, Bronxville.

1,481,373—Process of Producing Alkali Metal Cyanides. Charles B. Jacobs, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co.

1,481,374—Process for the Production of Alkali-Metal Cyanides. Charles B. Jacobs, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co.

1,481,399—Method of and Apparatus for Treating Carbonaceous Material. Louis P. Webert, Annapolis, Md.

1,481,407—Filtering Device. Archie E. Bass, Birmingham, Ala.

1,481,410—Machine for Drying Peat. Joseph Roch Brien, Montreal, Que., Canada, assignor of one-half to Lydia Plamondon, née Hardy, of Montreal.

1,481,426—Centrifugal Separator. Fred William McEntire, Spreckles, Calif.

1,481,428—Furnace Retort. Charles V. McIntire, East Orange, N. J., assignor to International Coal Products Corp., Richmond, Va.

1,481,430—Manufacture of Asphalt Roofing. Frederick C. Overbury, Hillsdale, N. J., assignor to Flintkote Co., Boston, Mass.

1,481,482—Agent for Accelerating Vulcanization of Rubber and Method of Producing Same. Stanley John Peachey, London, England.

1,481,584—Steam-Removing Means for Paper-Pulp Grinders. Charles A. Baxter, West Linn, Ore.

1,481,678—Esterification of Oils. Edward Richards Bolton and Ernest Joseph Lush, London, England, assignors to Technical Research Works, Ltd., London.

1,481,688—Glass-Delivering Apparatus. John W. Carnahan, Blackwell, Okla.

1,481,747—Refining of Ferrochrome. William R. Saltrick, Purley, England, assignor to Robert Wickersham Stimson, New York, N. Y.

1,481,751—Electrolytic Separator. William A. Sharpe, Denver, Colo.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

of the expressions "yearly saving" and "rate of yearly savings," with the result that they were variously construed; a majority, however, construing them as synonymous. We may therefore assume that the word "rate" is frequently given a broader meaning than is warranted by the dictionaries consulted.

In no instance within the writer's knowledge has any uncertainty developed as to the proper use of the formulas through the choice of wording employed. As a consequence it is thought that nothing would be gained from a practical standpoint from a variation in the present wording.

We appreciate very highly suggestions such as Mr. Sandstrom has given and shall in every instance give them very thorough investigation, in the hope that thereby any faults found in our presentation of the formulas may be ultimately identified and corrected.

JAMES A. SHEPARD,
Chairman, Committee on Application of Formulas, Materials Handling Division, A. S. M. E.
Montour Falls, N. Y.

To the Editor of Chem. & Met.:

SIR—It appears from the foregoing that Mr. Shepard and I are almost in agreement. The dictionary seems to be in accord with my suggestion that *rate* of yearly savings is more applicable than *yearly savings* when the term is modified by a factor expressing the percentage of time consumed by the operation. There is no question of uncertainty as to the proper use of the formulas as submitted and their notation. One cannot go wrong in their use. What is questionable is the use of an unnecessary term. It strikes me that "*rate* of yearly saving" is the correct term and which will certainly be used in a practical example involving a period less than a year and the use of the multiplier X. The aim of engineering is efficiency, which includes such trifles as the statement of a formula.

C. O. SANDSTROM.
Kansas City, Mo.

Calendar

AMERICAN CERAMIC SOCIETY, Atlantic City, N. J., Feb. 4 to 9.

AMERICAN CHEMICAL SOCIETY, annual meeting. Washington, April 21 to 25.

AMERICAN CONCRETE INSTITUTE, annual meeting, Chicago, Feb. 25 to 28.

AMERICAN ELECTROCHEMICAL SOCIETY, New York Section, Rumford Hall, Feb. 8.

AMERICAN ELECTROCHEMICAL SOCIETY, Hotel Bellevue-Stratford, Philadelphia, April 24 to 26.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, New York City, Feb. 18 to 21.

AMERICAN PHYSICAL SOCIETY, New York, Feb. 23.

CANADIAN NATIONAL CLAY PRODUCTS ASSOCIATION, Prince George Hotel, Toronto, Ont., Feb. 13 and 14.

COMMON BRICK MANUFACTURERS' ASSOCIATION, Biltmore Hotel, Los Angeles, Calif., Feb. 11 to 14.

PAPER INDUSTRIES EXPOSITION, New York, April 7 to 12.

SAFETY CONFERENCE, Engineering Section of the National Safety Council jointly with Chicago Safety Council and the Western Society of Engineers, Morrison Hotel, Chicago, Feb. 19.

Important Artieles in Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

GAS PRODUCER PRACTICE. *Waldemar Dyrssen.* A detailed and expansive discussion of tests on gas producers for determining heat and chemical balance. *The Blast Furnace & Steel Plant.* January, 1924, pp. 58-62.

FLUORSPAR: ITS OCCURRENCE AND PRODUCTION. *A. M. Michell.* The history and geology of this material. *The Blast Furnace & Steel Plant.* January, 1924, pp. 54-57.

FIBER BOARD MANUFACTURE. *Raymond H. Harding.* An able discussion of the technology involved in board manufacture. Special attention is called to the cooking, washing and beating of the fiber. *Paper,* Jan. 17, 1924, pp. 7-10.

DEVAINS PROCESS IN DETAIL. A somewhat superficial story of a process widely used in Europe for producing pulp for high-grade paper from straw. Interesting sidelights on French paper-making practice are included. *Paper,* Jan. 24, 1924, pp. 5-7.

EFFECT OF ZIRCONIA IN ENAMELS FOR SHEET STEEL. *H. G. Wolfram.* Study includes additions of the zirconia to the raw smelter batch of both the ground and cover enamels, also the substitution of zirconia for tin oxide in the mill batch. *Journal American Ceramic Society,* January, 1924, pp. 1-13.

THERMAL CONDUCTIVITIES OF SOME REFRACTORY MATERIALS. Studies made at the research laboratories of the Norton Co., using modified Hepplewhite method with means for preventing lateral flow of heat. *Journal American Ceramic Society,* January, 1924, pp. 19-28.

MANUFACTURE OF INSULATING BRICK FROM DIATOMACEOUS EARTH. *C. A. Smith.* Results indicate commercial possibility of producing insulating brick from powdered diatomaceous earth and clay by the dry press process. *Journal American Ceramic Society,* January, 1924, pp. 52-60.

DEAD BURNING OF DOLOMITE—I. J. T. *Robson and J. R. Withrow.* First of series covering the second phase of an investigation with the possibility of using dolomite as base material in manufacture of refractories. *Journal American Ceramic Society,* January, 1924, pp. 61-73.

WHAT SHOULD THE CERAMIC INDUSTRY STRIVE FOR IN 1924? A symposium covering all phases of the ceramic industry, the views being expressed by leaders in the various fields. *Ceramic Industry,* January, 1924, pp. 16-29.

Books Received

Annotated Bibliography on Rubber Chemistry

SYSTEMATIC SURVEY OF RUBBER CHEMISTRY. By *Clayton W. Bedford* and *Herbert A. Winkelmann.* 385 pages. Chemical Catalog Co., New York. Price, $7.

A bibliography, with copious abstracts, of the entire literature of rubber chemistry and closely allied subjects up to Jan. 1, 1923; thoroughly indexed by authors and subjects and completely cross-referenced; together with a patent index, an introduction by Dr. W. C. Geer, and introductory chapters on "Organic Accelerators of Vulcanization," by Dr. L. B. Sebrell and "Theories of Vulcanization" by Dr. W. J. Kelley.

A.S.T.M. Proceedings

PROCEEDINGS OF THE AMERICAN SOCIETY FOR TESTING MATERIALS. Vol. 23. Twenty-sixth Annual Meeting, 1923. Part I, Committee Reports, Tentative Standards, 1,006 pages. Part II, Technical Papers, 683 pages. Published by the Society at Philadelphia, Pa. Price, each part, $6 in paper, $6.50 in cloth, $8 in half-leather binding.

Part I contains the annual reports of thirty-two of the standing committees of the society, together with the discussion thereon at the annual meeting, and 103 tentative standards which have either been revised or are published for the first time; the annual address of the president and the annual report of the executive committee.

Part II contains fifty technical papers with discussion. The technical papers contain valuable information on results of investigations by experts in the field of engineering materials and the reports of the committees cover ferrous and non-ferrous metals, cement, ceramics, concrete, gypsum, lime, preservative coatings, petroleum products, road materials, coal and coke, waterproofing materials, electrical insulating materials, shipping containers, rubber products, textile materials, methods of testing, and nomenclature and definitions.

The Rarer Elements

CHEMISTRY OF THE RARER ELEMENTS. By *B. Smith Hopkins,* professor of inorganic chemistry, University of Illinois, 376 pages, illustrated. D. C. Heath & Co., New York. Price, $4.

The purpose of this work is to call attention both to the advances that have recently been made in our knowledge of the so-called "rare" elements and to the need for further research in the development of many of the less familiar elements.

A New Volume of Mellor

COMPREHENSIVE TREATISE ON INORGANIC AND THEORETICAL CHEMISTRY. By *J. W. Mellor, D.Sc.* Volume IV, Ra and Ac families, Be, Mg, Zn, Cd, Hg. 1074 pages. Illustrated. Longmans, Green & Co., New York. Price, $20.

To the physical chemist this will prove to be one of the most interesting in the series, for over 200 pages are devoted to the structure of matter, the architecture of the atom and kindred problems arising in a discussion of radium and radio-activity. Thorough treatments of beryllium, magnesium, zinc and cadmium, and mercury complete the volume.

News of the Industry

Summary of the Week

Dye importers suggest changes in regulations governing importations.

Imports of chemicals in December were much larger than in November, but exports declined slightly.

Tariff hearing on application for reduction in duty on phenol and cresylic acid has been postponed until Feb. 14.

Nitrite of soda suit brings out arguments from both sides relative to making public production costs of domestic manufacturers.

Swedish alkali plant will double capacity and seek export outlet for surplus production.

British and German dye interests reported to have entered into trade agreement.

Hooker's offer for Muscle Shoals outlined in detail. House Committee on Military Affairs considers four offers now pending.

Discussion of oxygen-enriched air in metallurgy a feature of meeting of A.I.M.E. to be held Feb. 18 to 21.

Support for Ford's Muscle Shoals Offer Apparently Weakened by Hearing

Meeting of House Committee on Military Affairs for Receiving Testimony Develops Merits of Other Independent Offers

HEARINGS before the House Committee on Military Affairs, which is considering the disposition of the government's Muscle Shoals properties, closed Tuesday with a noticeable trend away from the Ford offer. While it seems probable that a majority of the committee will recommend the acceptance of the Ford offer, it was very apparent that the support for that proposition had weakened and at least two members who have been supporting the Ford offer have decided to oppose it.

The feature of the closing sessions of the committee was the testimony of the important Southern interests showing a widespread demand for the distribution of the power in such a way as to make it available to the maximum possible number of people.

Just before the hearings closed E. H. Hooker, the president of the Hooker Electrochemical Co. of Niagara Falls, on behalf of himself, General W. W. Atterbury, vice-president of the Pennsylvania Railroad Co., and J. G. White, head of the White Engineering Co., of New York, submitted the fourth offer in connection with the Muscle Shoals properties. The Hooker offer proposes the formation of a company in which the United States will own 75 per cent of the stock. The company is to operate the water power and the nitrate plant. As an evidence of good faith, Mr. Hooker and his associates will contribute an operating fund of $1,000,000. During the first 10 years they are to receive 2½ per cent of the profits of the operation and after that 2 per cent. The balance goes to the government. They agree to set aside certain sums for research purposes and contend that their offer from a dollars-and-cents standpoint is more advantageous than any of the others.

Mr. Hooker is president of the Manufacturing Chemists' Association. He told the committee that over a 56-year period, without computing interest, the Ford offer would return $70,000,000 to the government. The offer of the associated power companies, he said, would return to the government $159,000,000. The offer which he presented, he declared, would return to the government at least $260,000,000, with a possible maximum of $500,000,000.

The trend away from the Ford offer was influenced to some extent by the refusal of Mr. Ford to appear before the committee, but the real force behind the change of position was the appearance of representatives of farmers, manufacturers and chambers of commerce, representing large blocks of the public in states in the Muscle Shoals region, who urged the utilization of the power for public utility rather than for manufacturing at Muscle Shoals.

At this writing, the committee is considering the four offers in executive session. Some are of the opinion that the majority will force a prompt recommendation before the anti-Ford sentiment can gain further momentum. Others think the anti-Ford members of the committee will be able to delay for some time any report by the committee. Regardless of what the committee may do, the general feeling is that Congress will not take final action for some time.

During the week Henry Ford informed the committee that he thought it unnecessary for himself or any representative to appear to discuss his offer further. Mr. Hull commented as follows on this refusal:

"The refusal of Henry Ford, as telegraphed, to come before the House Military Affairs Committee, at the committee's request, and make explanation to its members concerning certain details of his bid for the government's vast property and tremendously valuable water-power rights at Muscle Shoals, is not surprising to me. Mr. Ford is a wise man. He appreciates that he could not defend, before any committee of Congress, the proposition he has submitted for turning over to a corporation to be formed by him one of our greatest national resources for $110,000,000 less than the amount we are offered by other bidders.

"Apparently Mr. Ford does not welcome the opportunity presented for making personal guarantee to carry out his promise to manufacture cheap fertilizer or to explain certain ambiguous provisions in his offer connected with such manufacture. No definite provision is made in his proposal for the manufacture of cheap fertilizer and he prefers not to come before the committee and make personal guarantee that would be binding."

Representatives of the Union Carbide Co. appeared to explain its proposal. A. Cressy Morrison, presented the general subject; L. H. Davis, well-known hydro-electric engineer; and F. M. Becket, technical expert, all directly connected with the Union Carbide Co. for many years, were also present. These men laid emphasis on the point covered by its proposal that in the event the manufacture of the fertilizer should in the opinion of the government prove to be competitively impracticable, the company's offer does not contemplate that the power set aside for that purpose should be retained by the company but should go back to the government.

Domestic Interests Oppose Lower Duty for Phenol and Cresylic Acid

Production Costs Abroad Less Than in United States—Tariff Hearing Postponed Until Feb. 14

TESTIMONY regarding costs of production of phenol was presented before the Tariff Commission Jan. 24 in connection with an investigation under the flexible tariff following an application for reduction in the duty of 55 per cent ad valorem and 7 cents per pound under paragraph 27, covering coal-tar intermediates, of the 1922 tariff act.

Hearing regarding costs of producing cresylic acid had been set for the same date, but owing to an adjourned session of a sugar hearing being set for the afternoon, this case was postponed first until Jan. 25 and then until Feb. 14 owing to the inability of important witnesses to remain in Washington on the former date.

No representative appeared at the hearing in behalf of the applicant in the case of phenol, James F. Ballard, Inc., St. Louis, Mo. Dr. L. B. Redmond, of the Bakelite Corporation, which was represented by T. J. Doherty, of the law firm of DeVries & Doherty, testified in opposition, as did S. P. Miller, superintendent of the Philadelphia plant of The Barrett Co., which was represented by C. J. Nourse as attorney. The Bakelite Corporation produces synthetic phenol and The Barrett Co. produces natural phenol.

Importance of Domestic Supply of Phenol

Dr. Redmond stressed the importance of a domestic supply of phenol in view of the fact that Great Britain in two wars has established an embargo on this chemical. Last year 4,000,000 lb. was produced here, he testified, and additions are being made that will enable an annual output of 11,000,000 lb. Production of synthetic phenol has begun on a firm basis only since the 1922 tariff act became operative, he said.

Mr. Miller testified that while in 1921 only 100,000 lb. of domestic natural phenol was marketed, 1,600,000 lb. was marketed in 1923 and it is estimated that the output in 1924 will be between two and two and a half million pounds.

Domestic costs of production are considerably higher than those in England, the testimony showed, and this was substantiated by the preliminary summary of information furnished by the Tariff Commission.

The Cresylic Acid Situation

The commission's summary regarding cresylic acid indicates that there is little real need of a tariff reduction on this chemical, as foreign producers appear to have controlled their product so that less than 75 per cent distills below 215 deg. C. and therefore the product becomes duty free under paragraph 1549 of the act, although it can be converted to a higher grade by a comparatively simple process after arrival in the United States. Imports are increasing heavily, the summary showed.

The application for a reduction in the duty on cresylic acid will be supported by R. W. Chipman of New York, president of the Chipman Chemical Engineering Co., who will appear in behalf of the Insecticide and Disinfectant Manufacturers Association, one of the applicants, and by Horace W. Bigelow of Detroit, general attorney of Parke, Davis & Co., who will appear for that company and also for the Upjohn Co., Sharp & Dohme, Frederick Stearns & Co., Eli Lilly & Co. and the William S. Merrell Co. Harry D. Williams, of the Atlas Chemical Co., John J. O'Brien, representing the Atlantic Chemical Co., and representatives of The Barrett Co. will oppose the cresylic acid application.

The drug manufacturers claim that an insufficient supply of high-grade cresylic acid is obtainable in this country, The Barrett Co. being the principal producer and that owing to the high tariff rate an injustice is caused when it is necessary to import. The insecticide and disinfectant manufacturers also declare the supply of crude cresylic acid insufficient.

Mining Engineers' Plans for Annual Meeting

New York Gathering, Feb. 18 to 21. Will Listen to Many Topics of Interest

A 4-day meeting of the American Institute of Mining and Metallurgical Engineers opens Feb. 18 at the Engineering Societies Building, New York City. The program of technical papers to be presented indicates very full days Feb. 18 to 20. On Feb. 21 a trip through the plant of the Bethlehem Steel Co. is planned. The annual banquet for members and guests is to be held at the Waldorf-Astoria, Wednesday, Feb. 20. On Tuesday afternoon the Dr. H. M. Howe memorial lecture is to be held, at which time Dr. Albert Sauveur, Harvard University, will speak on "Steel Today and Yesterday."

On the opening day the morning session includes meetings to discuss petroleum (5 papers) and likewise to discuss coal and coke, ground movement and subsidence. At this meeting the eminent British engineers Dr. R. V. Wheeler and Henry Walker will be present. In the afternoon a symposium opens on 1923 developments in petroleum and gas—this runs through morning and afternoon of the second day with a total of 26 papers listed. Meetings on metallurgy (4 papers), industrial relations, and iron and steel (6 papers) precede the annual lecture of the Institute of Metals Division, which is to be given by Dr. Zay Jeffries on "The Trend of the Science in Metals." The evening is devoted to committee dinners and a smoker.

On Tuesday the opening meeting is given over to the annual business session, after which the divisions on mining methods (3 papers) and coal (4 papers) will hold morning meetings. In the afternoon the Institute of Metals will hear 4 papers; at a joint session of the Society and Institute of Economic Geologists 4 papers will be read; the committee on metallurgy meets (4 papers); likewise the committee on iron, steel and refractories (7 papers).

Milling (4 papers), mining methods (6 papers), industrial relations (4 papers) are scheduled for discussion Wednesday morning. In the afternoon the Economic Geologists conclude their session with 3 papers, and the Institute of Metals plans a round table discussion of fluxes and deoxidizers. During the same period a joint meeting with the Mining and Metallurgical Society of America is planned and also Bradley Stoughton will lead a discussion of the use of oxygenated air in metallurgical processes.

Following these technical sessions a reception from 3 to 6 is to be given by Senator Clark, preceding the evening banquet. During the 3 days an elaborate program for the ladies has been worked out by the Women's Auxiliary.

Thomson Receives Kelvin Medal

Prof. Elihu Thomson, one of the founders of the General Electric Co. and among the world's most eminent electrical engineers, has been awarded the Lord Kelvin gold medal and will go to England during the coming summer to receive it July 11.

The award was made by British and American engineering societies acting jointly. It is awarded every 3 years as a mark of distinction and for excellence in original research work in engineering. Professor Thomson is the first American to receive this honor.

Industrial Preparedness to Be Discussed by Engineers

Industrial preparedness as insurance against war is to be discussed at a meeting to be held at the Hotel Commodore, New York, on Feb. 5. This has been arranged jointly by the New York sections of the A.S.M.E., A.S.C.E., A.I.E.E., A.I.M.E. and S.A.E. with the War Department.

Judge Elbert H. Gary, chairman of the board, United States Steel Corporation, will preside at meeting. Dwight F. Davis, Assistant Secretary of War, will speak on industrial preparedness from the War Department standpoint. General John J. Carty, vice-president of the American Telephone & Telegraph Co., will discuss the necessity of industrial preparedness from the standpoint of the industries. Colonel James L. Walsh, chief of the New York Ordnance District, will crystallize the purpose of the meeting by describing the plans that should be made within the plants of prospective war materials manufacturers.

A personal invitation is being sent to each member of the engineering societies. It is the feeling of the committee that the War Department's plans should have the whole-hearted support of every engineer and of every citizen.

Washington News

Arguments Heard in Nitrite of Soda Suit

Arguments on a petition for a writ of mandamus filed on behalf of the Norwegian Nitrogen Products Co., New York, to compel the Tariff Commission to disclose to representatives of this company costs of production of domestic manufacturers of sodium nitrite were presented before Justice Siddins of the District of Columbia Supreme Court Jan. 25 and 26.

The Norwegian company is the American selling agent of producers of sodium nitrite in Norway who are opposing the application of the American Nitrogen Products Co., of Seattle, Wash., for an increase in the duty on sodium nitrite. The Norwegian company alleged that it could not properly defend the case without having access to the complete application of the American company.

Judge Marion DeVries, representing the Norwegian company, argued that costs of production could not be considered trade secrets and therefore entitled to the secrecy authorized by the law for information given the Tariff Commission. He also argued that the law prohibits individual commissioners or employees of the commission divulging information, but that the commission itself is not prohibited from opening such records to inspection by interested persons. Judge DeVries further urged the court to pass upon the constitutionality of the flexible provisions of the 1922 tariff act.

District Attorney Peyton Gordan and Commissioners Glassie and Culbertson, appearing for the Tariff Commission, contended that costs of production may be considered trade secrets. In any event, they contended, the Tariff Commission's decision in such matters is final and not subject to review by a court. The commission's representatives ignored the constitutional question raised by Judge DeVries, who declared his belief that the flexible tariff is constitutional.

Swedish Alkali Plant to Double Capacity

A report from Stockholm says that Maelarbanken has sold the Hudiksvall alkali works to a combine, which will start production about the middle of February. Operations will be on a large scale. The existing machinery is able to produce 5,000 tons of chloride of lime and 4,000 tons of alkali for the manufacture of soap annually, but after the new buildings already constructed have been put into service the output may be doubled. As the production will exceed the country's requirements, export will be necessary. Co-operation has been arranged with Svenska Pappersbrukens Handelsaktiebolag in connection with the sale of the chloride of lime produced by the works.

Importers Seek Change in Dye Regulations

Suggestions Are Offered for Aiding Appraisals of Importations

Suggestions of importing interests for amendment of the Treasury Department regulations governing administration of paragraphs 27 and 28 of the 1922 tariff act, covering coal-tar products, were laid before Assistant Secretary McKenzie Moss, Customs Director E. W. Camp and other Treasury officials at a conference Jan. 24. Representatives of domestic manufacturers opposed any immediate change in the regulations.

The importers put forward three major suggestions:

1. That a hearing be held by appraisal officers before a dye be placed on the competitive list, carrying American valuation.

2. That importers be permitted to ascertain from customs officials the United States value for purposes of appraisal of a non-competitive dye, as they are now allowed to ascertain the American valuation of a competitive dye.

3. That the monthly list of dye imports issued by the Department of Commerce in co-operation with the Tariff Commission omit prices, as inclusion of the latter in many cases divulges trade information to domestic manufacturers. This particular point is not within the jurisdiction of the Treasury Department.

Heavy Burden on Dye Industry

In general, the importers stated that the administration of the coal-tar paragraphs of the tariff act places burdens upon dye and chemical importers not imposed upon importers of other merchandise. They especially complained against a decision transferring an importation from the non-competitive list to the competitive list with its higher duty being considered a matter of appraisal rather than one of classification. As a matter of appraisal, a penalty is imposed if entry has been declared by the importer as non-competitive, whereas if the matter were one of classification the penalty would not be invoked. While penalties are returned upon evidence that no intentional fraud was contemplated, heavy sums are tied up awaiting return. The importers also declared that shipments of dyes are held up for long periods pending determination of whether they are competitive or non-competitive, thus interfering with business.

Representatives of domestic manufacturers asked that the regulations be undisturbed until further experience demonstrates the necessity of change, especially as the courts have held four sections of the regulations proper and cases are pending before the courts involving other points.

No decision was reached at the conference, both sides being given opportunity to file briefs and to examine the other's brief.

Representing domestic producers at the hearing were George Lamb, New York, of the law firm of DeVries & Doherty; Charles H. Herty, of the Synthetic Organic Chemical Manufacturers' Association; E. H. Killheffer, vice-president of the Newport Chemical Works; W. L. Van Riper, of the Du Pont corporation; and W. F. Keohan, representing the Chemical Foundation, Inc. Representing importing interests were Frank Halstead, New York, of the law firm of Barnes, Chilvers & Halstead; John F. Strauss, of Strauss & Hedges; George S. Davis, of the Council of Importers & Traders; E. R. Pickerell, of H. A. Metz & Co.; and Paul Pickhardt, of Kuttroff, Pickhardt & Co. Dr. W. N. Watson, dye specialist of the Chemical Division of the Tariff Commission, attended as special adviser to the Treasury Department.

Agreement Between British and German Dye Producers

Reports have reached this country to the effect that producers of dyes in Germany and in England have entered into an agreement whereby the consuming markets of the world will be allocated so as to avoid competition. These reports have not been confirmed, but it is generally held that steps toward such a trade compact had been taken some time ago. It is stated that for 2 years the British Dyestuffs Corporation has been working on an arrangement with German interests. In addition to a division of foregin markets, it is stated that British manufacturers plan to use German formulas and even to employ German workmen.

Russia Adopts Metric System

A message from Moscow says that the commission for the introduction of metric weights and measures in the Russian state co-operative societies and the private enterprises has fixed as follows the dates on which the new system goes into force: sugar, Aug. 1; tobacco, March 1; vegetable oil and electro-technical goods, went into force Jan. 1; flour, cereals and milling products, also salt, Aug. 1; tea, coffee, chicory, preserves and chemical products, July 1; leather and yeast, June 1. These dates apply to trade in the above articles; in industry the metric unit for all these goods became effective Jan. 1, 1924.

Linseed Oil Hearing Postponed

The Tariff Commission has postponed until March 5 the public hearing into costs of production of linseed oil which had been set for Feb. 5. The delay was requested by counsel for domestic flaxseed crushers who are opposing the application of the Bureau of Raw Materials, representing paint and soap manufacturers, for a decrease in the duty under the flexible tariff. Various other vegetable oil interests which will help resist the proposal for a reduction in linseed oil also joined in the request for a postponement, and attorneys for the applicant agreed to the delay.

Men in the Profession

A. W. ALLEN, assistant editor of *Chem. & Met.*, located in the San Francisco office, has returned there after a visit to the New York office of several months.

Dr. H. FOSTER BAIN, director of the U. S. Bureau of Mines, gave an address before the engineering students of the Carnegie Institute of Technology, Pittsburgh, Pa., Jan. 22.

JOHN A. BAKER has again joined the Dorr Co. Mr. Baker was graduated from Yale in 1907 with the degree of Ph.B. He then did some post-graduate work at the Colorado School of Mines, Golden, Colo. His experience until 1916 embraces mining and metallurgical work in the West and eastern Canadian mining fields, mainly in copper, gold, silver and chromium. During part of this time he was associated with the Dorr Co. After service with the U. S. Army he again joined the Dorr Co. in 1919 as director of its Westport mill, but owing to ill health was forced to resign in 1922. Having completely recuperated, Mr. Baker has again joined the Dorr Co. and after spending some time familiarizing himself with the company's present lines of work will take over the directorship of the Westport mill and assist in the company's other engineering activities.

CHARLES J. BOGART, Eastern representative in New York of the U. S. Encaustic Tile Co., Indianapolis, Ind., gave an interesting lecture recently at the West Side Y.M.C.A., New York, on the subject of tile work, dealing with phases of production and growth.

WILLIAM H. BOSHART, general manager of the Owens Bottle Co., Toledo, Ohio, has been elected executive vice-president in addition to his present duties, in the latter capacity succeeding James C. Blair, who resigned to devote his entire attention to the Libbey-Owens Glass Co., an affiliated interest, of which he is vice-president and general manager.

FRANK P. KENNISON, vice-president and trust officer of the Ohio Savings Bank & Trust Co., was recently elected a director of the Owens Bottle Co. to fill the vacancy caused by the recent death of Michael J. Owens. Mr. Kennison also is a director of the Toledo Glass Co., the parent organization in the development of the various Libbey glass patents.

Dr. WHEELER P. DAVEY, of the research laboratory of the General Electric Co., Schenectady, N. Y., spoke before the Franklin Institute, Jan. 31, on "Radiation."

L. M. FANNING resigned as director of the division of publicity and statistics of the American Petroleum Institute on Feb. 1. When the Institute created its department of publicity and statistics in 1920, Mr. Fanning was selected to direct it. Prior to coming to the Institute he was editor of the *Oil Trade Journal*. He is now a special staff representative of the *Oil & Gas Journal*, with headquarters in New York.

T. S. HAIGHT will resign as president of the American Hide & Leather Co., New York, on March 1. Aaron Hecht, first vice-president, has also tendered his resignation, taking effect at the same time.

REUBEN HALEY, general factory manager of the United States Glass Co., Beaver Falls, Pa., has been elected president of the Western Glass & Pottery Association, Pittsburgh, Pa.

ABEL HANSEN, president of the Fords Porcelain Works, Perth Amboy, N. J., has been re-elected president of the Fords National Bank, Fords, N. J.

Dr. CHARLES H. HERTY spoke before the Franklin Institute, Jan. 16, on "The Coal Tar Industries of the United States." He also spoke before the members of the Maryland Section of the American Chemical Society, Jan. 25, on "The Chemical Industry as Affected by Patents."

JAMES TAYLOR KEMP has resigned as metallurgist for the International Nickel Co. of Canada, Ltd., at Port Colborne, Ont., to take a position in the metallurgical department of the American Brass Co. at Waterbury, Conn.

KARL P. KLENK is now research chemist with the Hilton-Davis Co., consulting chemist, in Cincinnati.

P. G. PARIS, director of the Westport mill of the Dorr Co., will leave Feb. 7 to rejoin the Bethlehem Steel Co., with which he was formerly affiliated. He will be connected with the patent and research department and will act as consulting engineer on ordnance work. Mr. Paris was with the Dorr Co. a little more than a year. John A. Baker will succeed Mr. Paris, as noted above.

V. E. READY, who completed some development work on purification of argon for use in incandescent lamps for the National Lamp Works of the General Electric Co., has resigned to accept a position to carry out some special investigations for the Midway Gas Co., Taft, Calif.

Dr. CHARLES L. REESE, chemical director of E. I. du Pont de Nemours & Co., Wilmington, Del., gave an interesting lecture before a meeting of the local Silverbrook Men's Club, Silverbrook Church House, Jan. 24, on "Chemistry as It Affects Our Everyday Life."

STEPHEN SCHWARTZ, vice-president and manager of the Indiana Oil Refining Co., Columbus, Ind., has resigned.

CHARLES B. SEGER, chairman of the board and president of the United States Rubber Co., New York, has been elected president of the United States Rubber Export Co., Ltd., succeeding E. H. Huxley, resigned.

Dr. ALFRED STANSFIELD, McGill University, gave the second and last of his lectures at the Carnegie Institute of Technology, Pittsburgh, Pa., Jan. 18, on the smelting of iron ores.

FRANK O. TAYLOR, assistant chief chemist of Parke, Davis & Co., Detroit, Mich., and former professor of chemistry at the University of Cincinnati, gave an address recently before the Detroit branch of the American Pharmaceutical Association on "Choice and Chance in Scientific Discovery."

NORMAN WATKINS, vice-president and general manager of the Pacific Guano & Fertilizer Co., with headquarters at Honolulu, is on a visit to California, making a tour of inspection of the company's territory in that state.

Dr. JAMES R. WITHROW, professor of industrial chemistry at the Ohio State University, recently addressed the student body at Kenyon College, Gambier, Ohio, on "The Importance of Chemistry to Society in Our Modern Life." Professor Withrow also addressed Professor Lord's class in industrial chemistry on "Fundamental Attitudes of Mind in Industrial Relations." While in Gambier Professor Withrow also addressed the pupils of Harcourt Place Girls School on "Chemistry and Personal Life."

Obituary

EDWARD T. ALDRICH, vice-president and director of the Hood Rubber Co., Watertown, Mass., died at his home at Brookline, Mass., Jan. 23, aged 72 years.

DANIEL MOYER BUCK, well-known metallurgical engineer, died at his home at Vandergrift, Pa., Jan. 23, at the age of 47 years. He was a graduate of the Case School of Applied Science, Cleveland, Ohio, and had been a resident of Pittsburgh, Pa., and vicinity for the past 15 years, for 10 of which he was connected with the American Sheet & Tin Plate Co., Pittsburgh. He was a member of a number of technical societies, including the American Chemical Society, American Electrochemical Society, American Society for Testing Materials, American Ceramic Society, American Iron and Steel Institute and others. He is survived by his wife, one son and a daughter.

MATTHEW T. GAY, for the past 30 years president of Blanchard Bros. & Lane, Newark, N. J., leather manufacturers, died Jan. 19 at his residence at East Orange, N. J., at the age of 79 years. He had been in poor health for about 2 months past. He is survived by his wife, two sons and a daughter.

ROY W. HILTS, chief of the Western food and drug inspection district of the Bureau of Chemistry, died Jan. 12 at San Francisco. He had been ill for several days with heart disease. Mr. Hilts entered the service of the Bureau of Chemistry in 1907, when he received an appointment as a food and drug inspection chemist in the Chicago station. He was transferred to the Philadelphia station in 1908, and in 1912 was appointed chief of the Seattle station. In

1914 he was placed in charge of the San Francisco station, and in 1917 was made chief of the Western district. Mr. Hilts received the degree of B.A. from the University of Illinois, undergraduate work being done at that university, the University of Colorado and the Leland Stanford Junior University. For three years thereafter he was employed as a chemist by Armour & Co.

ALFRED WALLING OGDEN, nationally known as an expert food chemist, died at his residence at East Orange, N. J., Jan. 21, after a long illness. He was born at Keyport, N. J., in 1869, and was graduated from Yale University in 1890, entering the Connecticut Agricultural Experiment Station at New Haven as food chemist. Mr. Ogden started the Pure Food Laboratory of the Bureau of Chemistry, Department of Agriculture, in New York, in 1904. He was assistant chief for a number of years, later becoming acting chief, which position he held in 1917 at the time of his resignation on account of ill health. He is survived by his wife and three daughters.

WILLIAM WELFORD RANDOLPH, consulting gas engineer, died Jan. 23 at his residence, East Orange, N. J., after a long illness. He was 59 years of age. Mr. Randolph was educated at the University of Virginia and the Stevens Institute of Technology, graduating from the last noted institution in 1886. At the time of his death he maintained his consulting office in New York. He is survived by his wife, two sons and a daughter.

Imports of Chemicals Increase Sharply During December

Materials on Free List Nearly Double Totals for November—Exports Show Slight Falling Off

IMPORTS of chemicals and allied products took a decided upturn in December. Free list chemicals to the extent of $8,465,516 were imported in that month. This is nearly double the volume of free list imports in November. The imports of dutiable chemicals aggregated $3,027,355. This represents only a slight increase over the volume of November receipts. There was a falling off, however, in imports of coal-tar chemicals. The December total was $1,280,811. This compares with $1,475,-524 in November.

Larger Fertilizer Imports

The increase in imports of fertilizers was striking. The value of these imports alone was $6,643,030. This compares with $2,976.013 in November and $3,790,619 in December of 1922. With the exception of manure salts, the increase was spread in about the same proportion throughout the list. The imports of nitrate of soda jumped from 30,000 tons in November to nearly 88,000 tons in December. Sulphate of ammonia, despite the duty, jumped from 176 tons in November to 3,183 tons in December. The detail of the December imports of fertilizers is as follows:

	Tons
Calcium cyanamide	13,138
Calcium nitrate	1,068
Sodium nitrate	87,780
Sulphate of ammonia	3,183
All other nitrogeneous fertilizers	15,959
Bonephosphates	5,735
Other phosphate materials	55
Muriate of potash	14,529
Sulphate of potash	6,637
Kainite	18,968
Manure salts	15,532
Other potash-bearing substances	395
All other fertilizers	6,155

Paint and Varnish Imports Increase

Paints, pigments and varnishes valued at $319,113 were imported during December. This represents a substantial increase over November and over December of 1922. Some of the more significant changes, as shown by the figures which the Department of Commerce has just compiled covering imports during December, are as follows (quantities are expressed in pounds):

	Dec. 1922	Dec. 1923
Naphthalene	627,419	1,927,614
Carbolic acid	24,510	.....
Natural indigo	1,102	619
White arsenic	699,697	2,814,018
Formic acid	11,001	140,901
Oxalic acid	488,950	228,441
Sulphuric acid	432,000	1,711,655
Chloride of ammonia	.....	440,904
Nitrate of ammonia	507	400,446
Perchlorate of ammonia	259,938	110
Arsenic sulphide	334,523	22,900
Barium compounds	744,156	1,176,082
Cyanide of potash	236,263	329,194
Carbonate of potash	463,134	917,979
Sodium cyanide	1,129,577	2,850,714

Exports of chemicals during December decreased slightly. The total for chemicals and allied products for that month was $8,804,578. They were $300,000 greater in November. There was an increase, however, in the exports of coal-tar products. The shipments leaving the country during December were valued at $1,064,435, which is nearly $400,000 greater than the forwardings in November and almost double those of December, 1922.

Exports of sodas and sodium compounds totaled 27,901,170 lb., as compared with November forwardings of over 29,000,000 lb.

Pigments, paints and varnishes to the extent of $1,156,423 were exported in December, as compared with $1,407,-595 in November. The forwardings were in excess, however, of December, 1922.

Fertilizer Exports Less

Exports of fertilizers in December totaled 51,408 tons. This is a decrease of 34,000 tons as compared with November and 14,000 tons as compared with December of 1922. There was an increase, however, in the exports of sulphate of ammonia. The December forwardings amounted to 8,520 tons. In November the total was 6,689 tons. The movement of high-grade phosphate rock also increased. December exports were 7,300 tons, more than twice the quantity exported in November. There was a corresponding decrease, however, in land pebble. Explosives exports in December total 1,810,070 lb., a decrease of 200,000 lb. as compared with November. Some of the detailed items taken from the December export figures are as follows (in pounds):

	Dec. 1922	Dec. 1923
Carbolic acid	93,461	3,729
Acetic acid	531,986	1,359,665
Sulphuric acid	95,263	61,299
Ammonia and ammonium compounds	688,674	6,542,823
Aluminum sulphate	3,060,517	2,614,233
Calcium carbide	841,610	605,625
Acetate of lime	2,210,350	1,347,667
Bleaching powder	4,089,450	1,455,386
Copper sulphate	392,325	79,825
Sodium cyanide	115,258	16,256
Borax	3,108,382	4,517,420
Sal soda	2,529,745	2,361,709

Corrosion Surveys Completed

The first three numbers of the mimeographed series of "Research Information Surveys on Corrosion of Metals," relating to nickel, aluminum and copper, compiled in the Research Information Service, National Research Council, by Harold F. Whittaker, are now obtainable, bound under one cover, from the Publications Office, National Research Council, 1701 Massachusetts Ave., Washington, D. C., for $2.

Trade Notes

H. C. Baker, formerly secretary of the Meteor Products Co., is now connected with Eugene Suter & Co.

E. J. Cornish, president of the National Lead Co., returned last week from a 4-months stay in Europe.

W. J. Canary & Co. of 40 Rector St., brokers in chemicals and fertilizers, have succeeded the firm of Wilson, Canary & Co.

The Palmer Match Co. of Akron, Ohio, will begin operations in about 2 months. The company was formed several years ago.

The output of chrome ore in Rhodesia in December was 6,859 tons. In the same month Rhodesia produced 84 tons of arsenic.

The Multi Metal Co., Inc., has moved from 254 W. 19th St., New York, to its own building at 799 E. 39th St. The company manufactures sieves, wire cloth, filter cloth and kindred products.

Edward Reuther, formerly with the Midland Linseed Co. and later with the Archer-Daniels-Midland Co., is now in charge of the linseed oil department of E. R. Smead Co. The latter company is the New York sales representatives of the Brisbee Linseed Co. of Philadelphia.

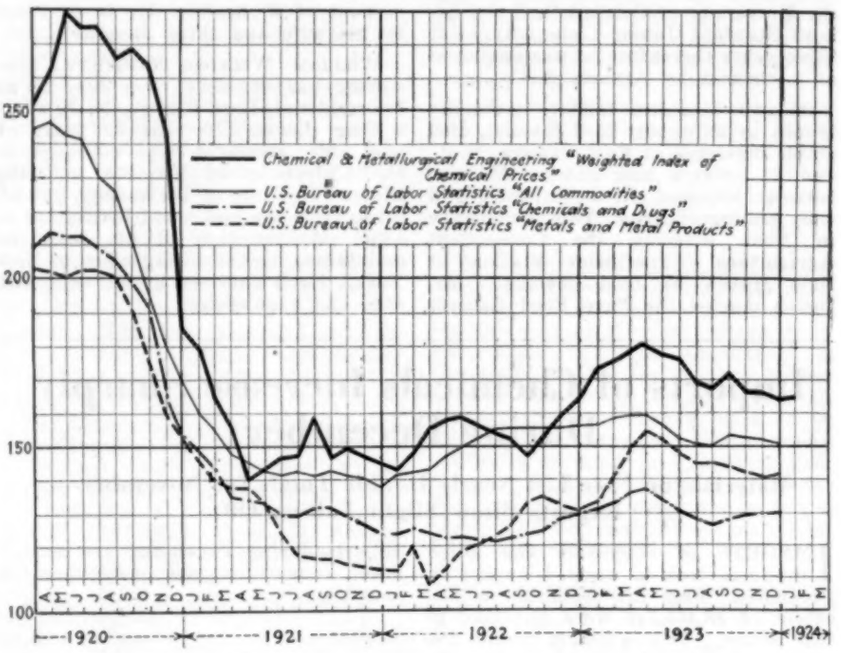
A decision of importance to the alkali industry and to the pulp and paper industry has just been handed down by the Interstate Commerce Commission as a result of the efforts of the Mathieson Alkali Works, Inc., to have its multi-unit chlorine tank car given the same rating and privileges as other tank cars. The decision of the commission places the specially designed Mathieson car on an equal basis with other tank cars.

Chemical Prices Throughout January Maintain Steady Level

Average for the Month Practically Coincides With Weighted Index Number for the Beginning of the Period—Contract Orders Absorb Large Part of Current Production

DISTRIBUTION of chemicals in January was not on as large a scale as in the corresponding month of last year. In 1923 a heavy buying movement, both for domestic and foreign delivery, featured the early trading. Throughout the past month consuming demand was along more conservative lines. This may be partly explained by the relatively quieter position of many industries that offer the largest outlet for these materials. Price levels in the latter part of last year were attractive and invited heavy contracting for 1924 requirements. For this reason manufacturing requirements were well covered ahead and deliveries against existing orders absorbed a major part of production. Incidentally it may be stated that producers of chemicals and kindred products entered the year with orders on hand aggregating approximately the same as in the preceding year.

The course of prices during January was pretty much along a straight line. Values for most selections had been established in conformity with producing costs in the closing months of 1923. More recent developments in the raw materials had not been sufficient to require further readjustments in prices for the finished products. This is indicated in the weighted index number, which stood at 164.43 at the beginning of the year and which averaged 164.40 for the month. Perhaps the most important development in values is found in a higher sales schedule for bleaching powder and liquid chlorine. The upward revision in these materials was of more than passing interest, because it was regarded as a declaration of the discontinuance of ruinous competition.



The possible influence of changes in import duties on chemicals was again emphasized during the month when hearings were held by the Tariff Commission in answer to requests for reductions in the rates now in effect on phenol and cresylic acid. However, no definite action was taken nor has anything yet resulted from the numerous hearings on chemicals that had been held previously.

Bureau of Labor statistics in reporting on wholesale prices for 404 commodities in December state that there was a further slight reduction, although higher prices ruled for 117 of these commodities. The weighted number of the bureau declined to 151 for December, as compared with 152 for the preceding month. The chemical and drug group stood at 130 in both months and metals and metal products advanced to 142 for December, as against 141 for November. According to the bureau's compilation, the all-commodity list in December showed a decline of 3¼ per cent from the corresponding month of 1922. In the same period chemicals and drugs were unchanged with metals and metal products higher by more than 8 per cent.

America to Produce Its Own Tung Oil

Almost twelve million gallons of china wood oil, worth approximately $15,000,000, was imported last year for the manufacture of oil varnishes. Ten years ago less than 5,000,000 gal. was being consumed, but even then the U. S. Paint Manufacturers' Association recognized the great advantages that would accrue from the economical production of this commodity within our own borders. Accordingly in 1912 an attempt was made to transplant the tung tree in Florida and Georgia.

It is now reported that the American Tung Oil Corporation, recently organized under the laws of Florida, is at work planting two groves of tung nut trees, one of 70 acres and the other of 200 acres. Both are near Gainesville. The trees are secured from a nearby nursery covering about 6 acres of land and upon which are 125,000 seedlings about 9 years old and 12 to 30 in. in height. It is reported that up to the present time seventy-five subscriptions have been received from varnish manufacturers and others interested in tung oil.

James H. McNulty is president, Ludington Patton vice-president and Dr. Henry A. Gardner vice-president and general manager of the new corporation.

Georgia Also Produces

F. H. Smith, chemist, Georgia Experiment Station, reports in the Jannary issue of *The Oil Miller* that the tung tree can also be grown successfully in any part of south Georgia. A number of trees have survived since the 1912 plantings as far up in that state as Griffin, and on quite different types of soil from that on which the Florida trees are planted. Mr. Smith estimates the acreage needed to furnish all the oil the paint industry demands at somewhere above 50,000 acres, on the basis of yields obtained in experimental groves in this country. He believes that at this time the only uncertainty is whether or not the paint people will buy the oil or nuts after they are produced. Developments within the past few weeks indicate that they are willing to contract for a limited supply, and for this reason it seems advisable to report some results of experiments with the tung oil trees.

A sample of kernels from nuts grown at the Georgia Experiment Station contained 63 per cent oil, 37 per cent meal residue, and in the unextracted kernels there was 2.66 per cent nitrogen. On account of the poisonous nature of the oil the extracted cake would be useless as a feed, but could be used for fertilizer purposes. At the Georgia station it proved to be only slightly less valuable than cottonseed meal as a source of nitrogen. With extraction of the greater portion of the oil the nitrogen content would be close to 6 per cent, and the cake would also contain about 2 per cent phosphoric acid and potash.

The trees begin producing within 2 or 3 years, and when 4 years old a gallon of oil per tree is about what can be expected. The plants are grown from nuts planted preferably in December. At present there is a considerable supply of 1-year-old seedlings.

Market Conditions

Consuming Trades Slow to Take on Additional Lots of Chemicals

Contract Shipments Fill Major Part of Current Requirements—Quiet Demand Gives Easy Tone to Values

WITHDRAWALS of many chemicals against contracts account for a fairly large distribution but trading for spot and prompt delivery is quiet. Fertilizer chemicals are moving in a disappointing way, although predictions are heard to the effect that the present year will see a larger consumption than for several years immediately preceding. The tanning trade likewise is taking on materials in a conservative way. This is also true of some branches of the textile trade. Chemicals for manufacture of insecticides and kindred products are not active and there is difficulty in moving arsenic and calcium arsenate because buyers of the latter are looking for lower prices. In short different industries which consume chemicals are not operating actively and are showing less interest in the market on that account.

The weighted index number for the week fell off to 162.74 as compared with 164 for the preceding week. Allied materials had much to do with the lower price level but there was more or less irregularity throughout the strictly chemical list. Among the important chemicals which show an easy price tendency is caustic soda. This refers to quotations for export rather than to the home trade. Arsenic is not moving freely and the situation is becoming more involved as domestic producers do not find the slow call for stocks and the easing off of values an inducement to expand their output.

Official figures for the export and import trade in chemicals during December were made known last week. These figures tell of a sharp expansion in arrivals from foreign countries. Exports, however, were on a slightly reduced scale.

Acids

The market for acids has been featured by price fluctuations. Increased buying was responsible for firmer prices for imported offerings of citric and tartaric acids. Arrivals of the latter during the week were large but a good part of them were taken off the market and values were not adversely affected. Oxalic acid has been subject to private terms and selling pressure placed this material on an attractive trading basis with reports that as low as 11c. per lb. could be done on both spot and shipments. Mineral acids are in good supply and quoted price levels are not being strictly maintained. Some competition is found in sulphuric acid from foreign supplies and in December imports reached a total of 1,711,655 lb. whereas exports in the same month were only 61,299 lb. Acetic acid is not meeting with much of a call for export and outward shipments in December were 3,729 lb. There is a fair movement to domestic consumers but most of this is against old orders and new business is light. Formic acid is reported to be firm in foreign markets and offerings in the spot market are in firm hands.

Arsenic Lower on Spot—Prussiate of Soda Firmer—Prussiate of Potash Lower—Tin Oxide Marked Up—Sal Ammoniac Steadier—Calcium Arsenate Sells Off—Acetate of Lead Higher—Oxalic Acid Easy—Copper Sulphate Quiet and Easy.

Potashes

Bichromate of Potash—Reports from different quarters agree that this material is in a strong position. There is practically no resale supply and, as producers are not forcing matters, the market is free from pressure. Open quotations are on a basis of 9½c. to 10c. per lb., with the range depending on quantity.

Carbonate of Potash—Arrivals of carbonate of potash from abroad in December were 917,979 lb. as compared with 463,134 lb. in the corresponding period of 1922. Fair business has been put through in the past 2 weeks. Prices have been held down to replacement levels and this has given confidence to buyers. Quotations for hydrated 80-85 per cent are 5½c. per lb. with calcined at 5¼c. per lb. Calcined 96-98 per cent was easy at 5¾c. per lb. with reports that this has been shaded.

Caustic Potash—Sellers report that prompt shipment from abroad is firm because of limited offerings. This has had the effect of steadying values for spot material and 6½c. per lb. is generally quoted for the latter. In spite of small stocks it is difficult to maintain values on a steady basis and it was possible to do 6⅝c. per lb. in some quarters. For shipments beginning after February offerings were more free and 6¼c. per lb. was quoted.

Permanganate of Potash—It is stated that the market is easier. This is explained by saying that while 14c. per lb. is still the inside figure it has applied to delivered goods with the seller absorbing the freight. The quotation of 14c. per lb. applies to both foreign and domestic grades. Trading during the week was slow.

Prussiate of Potash—There seems to be no limit to the downward movement of prices for yellow prussiate. Sales of spot goods were credited at 20c. per lb. Shipments were openly offered at 18c. per lb. and this acted as a check on demand for spot holdings. This material is finding competition with the soda product as well as with other materials and the stability of the market is further threatened by keen competition between foreign and domestic grades.

Sodas

Bichromate of Soda—There is less actual competition among sellers. This arises from the fact that stocks in all quarters are not large and some producers are not in position to compete on large orders. The tendency of prices is to harden and on moderate sized quantities 7⅜c. per lb. is quoted. On desirable business private terms may be arranged and it is possible to do 7¼c. per lb. Most of the business, however, is at 7⅜@7¾c. per lb.

Bisulphite of Soda—The spot market has held on a practically unchanged basis with $4.25 per 100 lb. asked by holders. Large lots on shipment from works are offered on more favorable terms and quotations of 3¾c. per lb. for carlot quantities are now heard.

Caustic Soda—It is stated that there has been an advance in freight rates from some producing points. This has had no bearing on the quoted prices for spot goods and it is reported that the advances, which are slight, are being absorbed by shippers. The most important development in the market consists in a lowering of prices for the export trade. During the past week there were offerings at $3 per 100 lb., f.a.s. New York. Other sellers were quoting $3.05 per 100 lb. The quotation for domestic trading was held at $3.10 per 100 lb. at works, and thus the market has reverted to its former position where export buyers are able to secure stocks on a lower price level than is offered the domestic trade.

Nitrate of Soda—Consumers not only have not been buying but in some cases have been reselling holdings. Prices were unsettled with reports of sales at $2.40 per 100 lb. at Southern points. Asking prices range up to $2.45 per 100 lb., but the latter figure was nominal. Imports in December are announced at 87,780 tons, which makes the total for 1923, 891,679 tons.

Prussiate of Soda—Some delay is reported in securing shipments from abroad. The spot market was firmer and holders of stocks established 11½c.

per lb. as their inside figure for spot material. Shipment prices were not disturbed and 11c. per lb. was an open price.

Soda Ash—As far as shipping instructions against old orders is concerned, the market is satisfactory. Contract holders are taking deliveries regularly. New business is not heavy and this applies equally to large lots and to the jobbing trade. There is nothing in sight to indicate any change in the selling schedule. The contract figure is maintained at $1.25 per 100 lb. for light ash in bulk; $1.38 per 100 lb. in bags; and $1.63 per 100 lb. in bbl., carlots at works. Dense ash holds at $1.35 per 100 lb. in bulk; $1.45 per 100 lb. in bags; and $1.69 per 100 lb. in bbl.

Miscellaneous Chemicals

Acetate of Lime—The improved demand for export in the past two months is shown by official figures which place exports in December at 1,347,667 lb. This indicates a material gain over exports in the fall months but is still below the totals for the preceding year. Deliveries of acetate of lime to domestic consumers is reported to be large. There is nothing new in the price schedule and $4 per 100 lb. is still given as the inside quotation.

Acetate of Lead—The strong position of the metal has finally resulted in a higher prices schedule for this salt. The increase amounts to ½c. per lb. over the levels previously quoted and the new schedule is: brown, broken, 13½c. per lb.; white, broken, 13.65c. per lb.; white, granular, 13.90c. per lb.; white, powdered, 15c. per lb.

Arsenic—In the official returns for December, imports of arsenic are given as 2,814,018 lb. This makes the calendar year imports 21,149,545 lb. In view of earlier reports to the effect that consumption of arsenic in the manufacture of calcium arsenate would be very large this year, the demand so far has not come up to expectations. No active buying has been noted so far this year and the past week was no exception. Holdings of imported grades are ample and prices are being cut without stimulating demand. Most holders are asking 12¾c. per lb. on spot but 12½c. per lb. is regarded as the trading basis.

Copper Sulphate — Spot holdings of imported sulphate are not much of a factor at present but shipments are freely offered at 4½c. per lb. There is very little interest in the foreign material in any position. Domestic grades are finding a fair outlet but values are easy and 4½c. per lb. is an open quotation for some offerings with up to 4.65c. per lb. asked.

Cream of Tartar — Continued low priced offerings of imported material had a depressing effect on the domestic product. The latter has been lowered in price and is now offered at 24c. per lb. Foreign material ranges from 22c. to 23c. per lb., with business of fair volume.

Sal Ammoniac — Most of the low priced offerings of foreign make have been taken from the market and a firmer feeling has been in evidence. The best price heard for white granular on spot was 6½c. per lb. Domestic is holding at 7½c. per lb. Shipments from abroad are offered at 6½c. per lb.

Sulphate of Ammonia — Outside of call for contract deliveries, call from the domestic trade was reported to be dull. Export business has been good but reports on inquiry last week varied. In some quarters it was stated that foreign buyers would not pay the prices asked and were interested only in prompt shipment of which there is a scarcity. Asking prices are on a basis of $2.90@$2.95 per 100 lb.

Tin Oxide—Recent advances in the metal market had given a firm tone to the oxide and predictions of higher selling prices for the latter were verified as producers announced a rise of 2c. per lb., making the quotation 53c. per lb.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	162.74
Last week	164.00
Feb., 1923	178.00
Feb., 1922	148.00
Feb., 1921	166.00
Feb., 1920	252.00
Feb., 1919	250.00
Feb., 1918	285.00

Lower prices obtained for copper sulphate and crude cottonseed oil and the weighted index number shows a drop of 126 points. Advances occurred in some of the metal salts.

Alcohol

A firm undertone featured the market for denatured alcohol, but no price changes took place. Business was fairly active on prompt as well as contract deliveries. Raw materials have held up well, which tends to strengthen the ideas of producers. There was no change in the position of ethyl spirits, first hands reporting a firm market. In methanol the situation seemed to favor buyers as slight pressure was in evidence in some quarters of the trade. Prices for methanol were quotably unchanged on the basis of 90c. per gal. for the pure, tank cars, works.

Coal-Tar Products

Expect Higher Market for Benzene—Crude Naphthalene Imports Increase—Pyridine Unsettled—Aniline Oil Firm

BUYING interest in benzene showed further improvement and a firm undertone prevailed in all quarters of the market. Leading producers did not change the selling schedule, although outside interests reported business at higher prices. Traders look for a general advance in prices for benzene to take place shortly. The tariff hearing on cresylic acid brought out nothing new in the situation and operators now feel that no change in the duty is likely to occur. Testimony submitted by the government showed that foreign producers have controlled their production of cresylic so that less than 75 per cent distills below 215 deg. C., and therefore it becomes duty free under paragraph 1549. Figures made available in the past week indicate that 21,036,498 lb. of naphthalene was imported into the United States in 1923, which compares with 3,144,332 lb. in 1922. Demand for pyridine has fallen off and prices presented an unsettled appearance, especially on shipment material. Aniline oil met with a steady call, and firm prices were reported by first hands. Phenol on spot was strong and wholly nominal in the absence of free offerings; contract prices closed unchanged.

Aniline Oil and Salt—Producers say that business was placed in aniline oil on the old basis of 16c. per lb., drums extra, nearby delivery, indicating that the market underwent no change. The undertone continues firm. Aniline salt held steady at 22@23c. per lb.

Benzene—Another general advance in crude petroleum steadied the market for gasoline, which, in turn, resulted in a firmer selling basis for the coal-tar product. Outside interests reported business in 90 per cent benzene at slightly higher quotations, but leading operators maintained prices on the basis of 21c. per gal., tanks, works. It was rumored that prices may be raised early in February, as demand has improved and stocks are smaller.

Cresylic Acid—Several shipments of cresylic acid arrived from Liverpool in the past week. Most holders of spot goods entertain steady views, believing that business in disinfectants should soon take on larger proportions. The quality of the material offered varies and on nearly all of the business passing samples are submitted.

Naphthalene — According to official figures the imports of naphthalene in December amounted to 1,927,614 lb., which compares with 627,419 lb. in December a year ago. Traders expect no shortage in supplies this year, as the heavy importations of crude, added to the domestic output, should take care of ordinary requirements. Prices underwent no change. Flake on spot held around 6½c. per lb., while on contract 6c. represented the market. Chips held around 5@5½c. per lb., as to quality and delivery. Intermediate makers are buying only moderately.

Phenol—Spot prices on U.S.P. material range all the way from 29@35c. per lb., in drums, the inside figure obtaining on goods shipped to regular customers only. Offerings were scanty, production being well sold up. On contract, covering round lots, the market held around 26@28c. per lb.

Pyridine—Few sales were reported and the market was unsettled in more than one direction. There were offerings at $3.25@$3.75 per gal.

Paranitraniline—Small lots sold on spot at 70c. per lb. The market was barely steady, with second hands offering material a little under prices named by first hands.

Xylene—Offerings were plentiful and prices continued to show irregularity. So-called pure material was available at 40c. per gal., tank car basis, prompt shipment from works.

Vegetable Oils and Fats

Further Weakness in Cottonseed—Linseed Barely Steady—Palm Oils Unsettled on Heavy Imports—Tallow Lower

DEMAND for oils and fats was less active and prices, with but few exceptions, presented an unsettled appearence. Cottonseed oil broke on liquidation in the option market, prices establishing new lows for the movement. The weakness in hog products had a bearish influence. The recent decline in tallow checked business in the palm oil group, and, with importations heavy, a little reselling took place towards the latter part of the week. Resale parcels of coconut oil and linseed oil also changed hands, the prices realized being a shade under what was regarded as the market. Offerings of refined sesame oil increased. One of the exceptions to the list which sold at lower levels was olive oil foots. In foots it was reported that recent low sellers abroad could not make good on contract deliveries and this was reflected by another uplift in the market here.

Cottonseed Oil—Crude cottonseed oil sold down to 8¾c. per lb., tank cars, f.o.b. mills, Texas and Southeast, a decline of ¼c. per lb. compared with the trading level of a week ago. Business in refined oil has not been so active and most refiners have been operating in crude to a limited extent only. The weakness in hogs and lard brought out selling pressure in the local option market for refined oil and the liquidation which followed sent prices sharply lower. Most of the selling orders came from the South. The recent unsettlement in cotton did not help matters any. The week witnessed no improvement in the consuming demand for refined oil. There were sellers of compound at 12¾@13c. per lb., carload basis, the price being barely steady because of rather keen competition. Private estimates on consumption of cottonseed oil during the month of January ranged from 160,000 to 175,000 bbl., which compares with actual distribution for January a year ago of 230,000 bbl.

Corn Oil—There was scattered business at 10c. per lb., tank car basis, f.o.b. Chicago.

Olive Oil Foots—Considerable quantities of foots sold some time ago for delivery soon after the turn of the year at prices ranging from 7¾c. to 8¼c. per lb., c.i.f. N. Y., and, according to importers, few shippers abroad have been able to make good on these contracts. Because of this peculiar situation the market here developed further strength, sales going through as high as 10¼c. per lb., nearby delivery, an advance of ¼c. for the week.

Palm Oil—Several cargoes of palm oil arrived from Africa, and, while most of the goods that came forward will go directly into consumption, a few resale parcels were available for immediate disposal at concessions. Niger oil was offered ex-dock at 7c. per lb., but the shipment price held at 7.05c. per lb., c.i.f. basis. Lagos was unchanged at 8c. per lb., with softs at 7¾c. per lb.

Soya Bean Oil—Offerings of crude oil from the Orient were few and prices wholly nominal. Prompt shipment from the Pacific coast was offered at 10c. per lb., duty paid, tank cars. The New York market setlled at 10¼c. per lb., with no buying interest.

Tallow, etc.—Recent sales of extra tallow went through at 8¼c. per lb., ex-plant, a decline of ¼c. Late in the week bids appeared on the market for extra at 7¾c. per lb., ex-plant. Yellow grease closed a shade lower at 6¾@6¾c. per lb., according to acidity. Oleo stearine was nominally ¼c. lower at 10c. per lb., carload basis. No. 1 oleo oil was barely steady at 16c. per lb. Crude menhaden oil held at 47½c. per gal., ex plant, with little available. There was no change in cod oil.

Argentine Flaxseed Crop Larger Than Last Year

The latest estimate on the Argentine flaxseed crop for the 1923-24 season places the total at 64,000,000 bu., which would provide for an exportable surplus of 58,000,000 bu. The crop a year ago approximated 51,000,000 bu., with actual exports of 43,600,000 bu. Shipments of new crop seed from Jan. 1 to Jan. 26, by countries, with a comparison, follow:

	1924, Bu.	1923, Bu.
United Kingdom	900,000	260,000
Continent	2,966,000	1,976,000
United States	1,052,000	2,068,000
On orders	1,036,000	1,628,000
Total	5,954,000	5,932,000

Linseed Oil—Buying of March delivery oil took place on a moderate scale, slightly more than 1,500 bbl. selling within the week on the basis of 90c. per gal., cooperage included. Prompt shipment oil closed unchanged at 91@92c. per gal. April-May was offered at 86@87c. per gal., with May forward wholly nominal at 85@86c. per gal. There was little or no demand for futures, large consumers holding off until a better prospective can be had in regard to spring business in finished products. Demand for paints has not come up to expectations and with ample supplies of flaxseed in sight buyers appear to be in no hurry to take on oil. The Argentine seed market ruled steady on active buying on the part of the United States and the Continent. There is a possibility of a dock strike at Buenos Aires and Rosario and this stimulated buying interest. The Argentine crop situation underwent no change, reports on the movement of new seed being favorable. There was talk of increasing the acreage in the United States this year as the crop of 1923 proved profitable to farmers. The tariff hearing for a reduction of the duty on seed and oil has been postponed from Feb. 5 to March 5. Cake on spot held at $40 per ton, f.a.s. N. Y., but futures closed around $37 per ton.

China Wood Oil—There were sales of prompt shipment oil at 19c. per lb., tank cars, f.o.b. Pacific coast ports, a decline of ¼c. for the week. Demand was moderate only and selling pressure was in evidence, chiefly in New York territory. In New York spot oil brought 20c. per lb., cooperage basis.

Coconut Oil—The sale of 6 tank cars of February-March shipment from the Pacific coast was reported at 8¾c. per lb., a decline of ¼c. On March forward 8¼c. was asked on both Manila and domestic Ceylon type oil, coast basis. Cebu sun-dried copra was offered at 5¾c. per lb., c.i.f. N. Y. Manila sun-dried was offered at 5¾c. per lb., c.i.f. San Francisco.

Miscellaneous Materials

Antimony—An advance of ¼c. per lb. was reported in Chinese antimony, the market settling at 10¼c. per lb. Cookson's "C" grade offered at 13c. per lb. Chinese needle antimony, lump, nominal at 8@8¼c. per lb. Standard powdered needle, 200 mesh, 8¼@9c. per lb. White oxide, Chinese, firm at 9c. per lb.

Glycerine—Dynamite glycerine sold in the West as low as 15c. per lb., carload basis, but operators in New York territory held out for 15¼@15½c. per lb. Chemically pure was unchanged at 16½c. per lb., in drums, carload basis, New York, while Chicago reported transactions at 16c. per lb. Crude soap lye, basis 80 per cent, sold down to 10½c. per lb., loose, f.o.b. points in the West. Saponification crude, basis 88 per cent, was nominal at 11¾c. per lb., loose, carload lots.

Shellac—The market was unsettled in all quarters, offerings from primary centers increasing. T. N. was available at 58c. per lb. Bleached, bonedry, settled at 69c. per lb., with superfine orange at 62c. per lb.

Naval Stores—Early in the week the market advanced to $1.04 on spirits of turpentine, but lack of buying interest soon resulted in freer offerings and towards the close the quotation was revised to $1.03 per gal., with the undertone barely steady. Rosins are moving against old contracts in fair volume, but new business was moderate only and prices were irregular. On the lower grades first hands quote $5.75 per bbl.

White Lead—The call for pig lead was less active, but there was no change in the official contract price, the market holding at 8c. per lb., New York. Corroders reported a fair volume of new orders for white lead and with the metal in a strong position the market for the pigment ruled firm at the recent advance. Standard dry white lead, in casks, was offered by leading producers at 9½c. per lb. The sulphate held at 9c. per lb.

Zinc Oxide—Slight improvement was reported in the demand, but this brought out no change in the attitude of sellers. The market for spelter was quotably unchanged. American process lead free oxide was unchanged on the basis of 6¾c. per lb. for carload lots, immediate shipment.

Financial Notes

The Vanadium Corporation of America for the second half of last year reports net earnings of approximately $300,000, as compared with $387,131 in the first half of the year.

The annual meeting of the Barnet Leather Co. will be held on Feb. 4. Stockholders will vote on plan to reduce preferred stock from $2,000,000 to $1,500,000.

Report of the Davison Chemical Co. and the Davison Sulphur & Phosphate Co. for the year ended Dec. 31 states gross profit from manufacturing and trading operations was $15,278 and profit from sale of 79,950 shares of the Silica Gel Corporation at $25 a share was sufficient to bring gross income to $2,081,811, comparing with $240,421 in preceding year.

The B. F. Goodrich Co. has declared regular quarterly dividend of $1.75 on the preferred stock.

The International Salt Co. for the quarter ended Dec. 31 reports a net loss of $88,663.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	74	78
Allied Chem. & Dye	69⅜	70
Allied Chem. & Dye pfd.	110½	111½
Am. Ag. Chem.	15	14½
Am. Ag. Chem. pfd.	43⅜	39
American Cotton Oil c'f's	11¼	11⅜
American Cyanamid	*84	*83
Am. Drug Synd.	6	6
Am. Linseed Co.	20¼	20
Am. Linseed pfd.	41⅜	40½
Am. Smelting & Refining Co.	59	59½
Am. Smelting & Refining pfd.	100	99½
Archer-Daniels Mid. Co. w.i.	26½	26½
Archer-Daniels Mid. Co. pfd.	89¼	89½
Atlas Powder	*53	*53
Casein Co. of Am.	*66	*66½
Certain-Teed Products	33⅜	33
Commercial Solvents "A"	*42	45½
Corn Products	174½	182½
Corn Products pfd.	*120	*120
Davison Chem.	63⅞	53⅜
Dow Chem. Co.	*47	*47
Du Pont de Nemours	130	132½
Du Pont de Nemours db.	85⅜	87
Freeport-Texas Sulphur	11⅜	10⅞
Grasselli Chem.	*125	*125
Grasselli Chem. pfd.	*102	*102
Hercules Powder	*104	*104
Hercules Powder pfd.	*103	*103
Heyden Chem.	2½	2
Intn'l Ag. Chem. Co. (new)	5½	5
Int'l Ag. Chem. pfd.	9¼	7½
Int'l Nickel	13	14⅜
Int'l Nickel pfd.	80⅞	82
Int'l Salt	*89½	*89½
Mathieson Alkali	38	38½
Merck & Co.	*60	*58
National Lead	144⅜	148
National Lead pfd.	112⅜	113½
New Jersey Zinc	*151	*150
Parke, Davis & Co.	80	*80
Pennsylvania Salt	*87½	*86½
Procter & Gamble	*130	*132
Sherwin-Williams	31	31
Sherwin-Williams pfd.	101	101
Tenn. Copper & Chem.	9½	9½
Texas Gulf Sulphur	62⅜	62⅜
Union Carbide	57⅜	59⅜
United Drug	*81½	84½
United Dyewood	*40	*40
U. S. Industrial Alcohol	74⅜	81⅜
U. S. Industrial Alcohol pfd.	100½	101
Va.-Car. Chem. Co.	7⅜	7½
Va.-Car. Chem. pfd.	27½	24

*Nominal. Other quotations based on last sale.

Imports at Port of New York

January 25 to January 31

ACIDS — Cresylic — 10 dr. Rotterdam, Black Diamond S.S. Co.; 72 dr. Liverpool, W. E. Jordan Bros. **Phenol**—134 keg solid, Liverpool, Order. **Tartaric**—300 bbl., Bari, Order; 50 keg, Rotterdam, W. Benkert & Co.; 1,000 csk., Palermo, Order.

ALCOHOL—1 dr. denatured, Callao, H. F. Gittens.

ALUMINA HYDRATE—450 bg., Rotterdam, R. W. Greeff & Co.

ALUMINA SULPHATE—49 csk., Rotterdam, A. Klipstein & Co.

AMMONIUM CARBONATE — 20 csk., Liverpool, Wiarda & Co. 10 keg, Liverpool, McKesson & Robbins.

ANTIMONY ORE—549 bg., Antofagasta, W. R. Grace & Co.

ANTIMONY OXIDE—250 cs., Hankow, Canadian Bank of Commerce.

ANTIMONY REGULUS—300 cs., Shanghai, Irving Bank-Col. Trust Co.

ANTIMONY SULPHIDE—5 csk. London, L. H. Butcher & Co.

ARSENIC—118 bbl., Tampico, American Smelting & Refining Co.; 91 bbl., Tampico, American Metal Co.; 50 csk., Antwerp, Schulz & Ruckgaber; 70 csk., Antwerp, National Bank of N. Y.; 111 csk., Antwerp, Irving Bank-Col. Trust Co., 312 csk., Antwerp, Order; 185 cs., Antwerp, Order; 245 bbl., Tampico, American Smelting & Refining Co.; 220 cs., Melbourne, Irving Bank-Col. Trust Co.; 96 csk., Rotterdam, American Express Co.; 190 cs., Shanghai, Wah Chang Trading Corp.

BLEACHING POWDER—75 cs., Liverpool, H. Kohnstamm & Co.

BAUXITE—57 tons, Paramaribo, A. M. Kohler.

CARBON—221 bg., Rotterdam, L. A. Salomon & Bros.

CASEIN—834 bg., Buenos Aires, Bank of America; 417 bg., Buenos Aires, National City Bank.

CHALK—500 bg., Antwerp, L. A. Salomon & Bros.; 500 bg., Antwerp, Reichard-Coulston, Inc.; 1,000 bg., Antwerp, Bankers Trust Co., 500 bg., Antwerp, Order; 500 tons, London, Taintor Trading Co.

CHEMICALS—17 cs., Havre, E. Fougera & Co.; 389 csk., Rotterdam, Hummel & Robinson Corp.; 17 csk., Rotterdam, Order; 55 cs., Rotterdam, R. F. Downing & Co.; 9 csk., Rotterdam, Roessler & Hasslacher Chemical Co.; 54 pkg., Bremen, Pfaltz & Bauer; 84 dr., London, J. W. Hampton & Co.

COAL-TAR DISTILLATE—60 dr., Glasgow, Order; 240 dr., Liverpool, Order.

COLORS—12 csk. aniline, Havre, Sandoz Chemical Works; 9 pkg. do., Havre, Geigy Co.; 23 pkg. do., Havre, Ciba Co.; 6 bbl. do., Havre, Carbic Color & Chemical Co.; 8 cs., Rotterdam, Reichard-Coulston, Inc.; 3 keg aniline, Rotterdam, American Exchange National Bank; 68 pkg. do., Rotterdam, Kuttroff, Pickhardt & Co.; 10 pkg. do., Rotterdam, Grasselli Chemical Co.; 3 csk. do., Rotterdam, A. H. Meyer; 20 csk. do., Rotterdam, Bank of the Manhattan Co.; 7 pkg. do., Rotterdam, Garfield Aniline Works; 9 csk. alizarin, Rotterdam, Kuttroff, Pickhardt & Co.; 21 csk. aniline, Rotterdam, H. A. Metz & Co.; 33 csk. earth, Rotterdam, Order; 10 csk. and 5 cs. aniline, Genoa, Ackerman Co.; 13 cs. do., Genoa, Order.

COPPERAS—48 bbl., Liverpool, Order.

DYEWOOD EXTRACT—54 bbl., Cristobal, H. W. Peabody & Co.

FUSEL OIL—29 dr., Antwerp, Order; 33 pkg., Buenos Aires, Order.

FUSTIC—2 pcs., Central America, C. H. Pearson & Son.

GLYCERINE—60 dr. crude, Rotterdam, Lunham & Reeve.

GUMS—256 bg. copal, Singapore, Brown Bros. & Co.; 100 cs., damar, Singapore, Chemical National Bank; 150 bg., copal, Antwerp, Equitable Trust Co.; 350 bg. copal, Adelaide, Baring Bros. & Co.; 515 bg. yacca, Adelaide, Order; 68 bg. copal, Antwerp, Chemical National Bank; 232 bg. copal, Antwerp, Order; 140 bg. copal Singapore, Brown Bros. & Co.; 250 bg. damar, Singapore, Baring Bros. & Co.; 210 bg. do. and 325 cs. do., Singapore, L. C. Gillespie & Son; 510 pkg. copal, Singapore, Order; 21 bg. copal, Liverpool. Williams Shipping Agency.

IRON OXIDE—14 csk., Liverpool, J. A. McNulty; 10 cs., Liverpool, Order.

LITHOPONE—40 csk., Rotterdam, L. H. Butcher Co.; 100 csk., Antwerp, A. Klipstein & Co.; 800 csk., Antwerp, B. Moore & Co.

MAGNESITE—313 bg. and 106 bbl., Rotterdam, Speiden, Whitefield Co.; 40 csk., Rotterdam, H. J. Baker & Bro.; 125 bg. and 44 bbl., Rotterdam, A. Kramer & Co.; 601 bg., Glasgow, Order.

MANGROVE BARK EXTRACT — 1,000 bg., Singapore, Order; 100 bx., Singapore, Order.

OILS—China Wood—150 bbl., Hankow, First National Bank of Boston; 296 bbl., Hankow, Jardine, Matheson & Co.; 2,885 bbl., Hankow, Order; 304 csk., Shanghai, Viele, Blackwell & Buck. **Coconut**—300 bbl. acid, Rotterdam, Equitable Trust Co.; 824 tons oil, Manila, Order; 756 tons, Manila, American Linseed Co. **Olive Foots** (sulphur oil)—120 bbl., Catania, L. C. Dever; 400 bbl., Bari, Order; 100 bbl., Palermo, Order. **Palm**—839 csk., Akassa, Irving Bank-Col. Trust Co.; 720 csk., Port Harcourt, Niger Co.; 252 csk., Buruti, Irving Bank-Col. Trust Co.; 720 csk., Koko, Niger Co.; 80 csk., Lagos, W. A. Leaman; 78 csk., Lagos, Grace Bros.; 240 csk., Lagos, Niger Co. **Sesame**—150 bbl., Rotterdam, Order; 200 bbl., Rotterdam, Incasso Bank; 610 bbl., Liverpool, Order. **Sperm**—30 bbl., Glasgow, Order.

OIL SEEDS—Castor—4,900 bg., Pernambuco, Order. **Linseed**—34,903 bg., Buenos Aires, Order.

PHOSPHORUS—60 cs., Antwerp, W. E. Miller.

POTASSIUM SALTS—2,812 bg., Muriate, Antwerp, Societe Com'l. des Potasses d'Alsace; 700 csk. chlorate, Antwerp, Chemical Electric & Metals Prod. Trading Corp.; 2,000 bg. muriate, Bremen, Potash Importing Corp. of Am.; 18 csk. prussiate, Liverpool, C. Tennant Sons & Co.

PYRIDINE—20 dr., Rotterdam, Lunham & Reeve; 3 dr., Antwerp, Industrial Chemical Co.; 10 dr., Rotterdam, Lunham & Reeve.

PYRITES—4,687,640 kilos (bulk, Huelva, Pyrites Co.

QUEBRACHO — 497 bg., Buenos Aires, First National Bank of Boston; 11,186 bg., Buenos Aires, Beekman, Winthrop Co.; 1,700 bg., Buenos Aires, Order.

SHELLAC — 16 cs., Rotterdam, C. F. Gerlach; 50 cs. and 50 bg., London, Doherr, Grimm & Co.; 500 bg., London, Order.

SODIUM SALTS—204 cs. cyanide, Havre, Asia Banking Corp.; 14,477 bg. nitrate, Mejillones, Wessel, Duval & Co.; 2,791 bg. nitrate, Mejillones, A. Gibbs & Co.; 52,853 bg. Nitrate, Iquique, W. R. Grace & Co.; 160 csk. hydrosulphite, Rotterdam, Kuttroff, Pickhardt & Co.; 21 csk. prussiate, Rotterdam, Meteor Products Co.; 41 csk. prussiate, Rotterdam, Order; 700 bg. phosphate, Antwerp, Hollingshurst & Co.; 156 dr. sulphide, Antwerp, E. M. Sergeant & Co.; 14,296 bg. nitrate, Iquique, W. R. Grace & Co.; 101 cs. cyanide, Liverpool, Order; 17 csk. prussiate, Liverpool, Order.

SUMAC—11 bg., Alexandretta, A. Partamian; 700 bg., Palermo, Order.

TALLOW—66 csk., Buenos Aires, Smithfield Argentine Meat Co.

TARTAR—1,027 bg., Buenos Aires, Royal Baking Powder Co.; 724 bg. Buenos Aires, C. Pfizer & Co.; 107 csk., Naples, Tartar Chemical Co.

UMBER—3,032 bg. burnt and 80 bg. raw, Larnaca, Irving Bank-Col. Trust Co.; 607 bg. calcined and 394 bg. crude, Larnaca, F. B. Vandegrift & Co.

VALONEA—3,195 sk., Smyrna, Order.

VANADIUM ORE — 15,147 sk., Callao, Vanadium Co. of America.

WAXES—6 bg. beeswax, Puerto Plata, Cordillera Comm. Co.; 83 bg. carnauba, Bahia, F. Huth & Co.; 20 bg. carnauba, Pernambuco, Elbert & Co.; 22 bbl. beeswax, Rotterdam, Ponds Extracts Co.; 32 bg. beeswax, Constantinople, Order; 50 bg. beeswax, Valparaiso, L. Luxardo Co.

ZINC OXIDE — 20 bbl., Havre, C. G. Tuber; 50 bbl., Antwerp, Philipp Bros., Inc.

ZINC WHITE—50 csk., Rotterdam, L. H. Butcher & Co.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0.25 –	$0.25½
Acetic anhydride, 85%, dr.	lb.	.38 –	
Acid, acetic, 28%, bbl.	100 lb.	3.38 –	3.63
Acetic, 56%, bbl.	100 lb.	6.75 –	7.00
Acetic, 80%, bbl.	100 lb.	9.58 –	9.83
Glacial, 99½%, bbl.	100 lb.	12.00 –	12.78
Boric, bbl.	lb.	.10 –	
Citric, kegs	lb.	.46½–	.48
Formic, 85%	lb.	.13 –	.13½
Gallic, tech.	lb.	.45 –	.50
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl.	lb.	.11½–	.12
22% tech., light, bbl.	lb.	.05½–	.06
Muriatic, 18° tanks	100 lb.	.90 –	1.00
Muriatic, 20°, tanks	100 lb.	1.00 –	1.10
Nitric, 36°, carboys	lb.	.04½–	.05
Nitric, 42°, carboys	lb.	.05½–	.05½
Oleum, 20%, tanks	ton	18.50 –	19.00
Oxalic, crystals, bbl.	lb.	.11½–	.11¾
Phosphoric, 50%, carboys	lb.	.07½–	.08½
Pyrogallic, resublimed	lb.	1.55 –	1.60
Sulphuric, 60°, tanks	ton	9.00 –	11.00
Sulphuric, 60°, drums	ton	13.00 –	14.00
Sulphuric, 66°, tanks	ton	15.00 –	16.00
Sulphuric, 66° drums	ton	20.00 –	21.00
Tannic, U.S.P., bbl.	lb.	.65 –	.70
Tannic, tech., bbl.	lb.	.45 –	.50
Tartaric, imp., powd., bbl.	lb.	.27 –	.27½
Tartaric, domestic, bbl.	lb.	.30 –	
Tungstic, per lb.	lb.	1.20 –	1.25
Alcohol, butyl, drums, f.o.b. works	lb.	.26 –	.28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.81 –	....
Ethyl, 190 p'f, U.S.P., bbl.	gal.	4.78 –	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.51½–	...
No. 1, 190 proof, special, dr.	gal.	.45½–	...
No. 1, 188 proof, bbl.	gal.	.52½–	...
No. 1, 188 proof, dr.	gal.	.48½–	...
No. 5, 188 proof, bbl.	gal.	.50½–	...
No. 5, 188 proof, dr.	gal.	.44½–	...
Alum, ammonia, lump, bbl.	lb.	.03½–	.04
Potash, lump, bbl.	lb.	.02½–	.03¾
Chrome, lump, potash, bbl.	lb.	.05½–	.06
Aluminum sulphate, com., bags	100 lb.	1.40 –	1.50
Iron free bags	lb.	2.40 –	2.50
Aqua ammonia, 26°, drums	lb.	.07 –	.07½
Ammonia, anhydrous, cyl.	lb.	.30 –	.30½
Ammonium carbonate, powd. tech., casks	lb.	.09 –	.09½
Ammonium nitrate, tech., casks	lb.	.09 –	.10
Amyl acetate tech., drums	gal.	4.50 –	4.75
Antimony oxide, white, bbl.	lb.	.08 –	.08½
Arsenic, white, powd., bbl.	lb.	.12½–	.12½
Arsenic, red, powd., kegs	lb.	.15 –	.15½
Barium carbonate, bbl.	ton	65.00 –	67.00
Barium chloride, bbl.	ton	84.00 –	90.00
Barium dioxide, 88% drums	lb.	.17½–	.18
Barium nitrate, casks		.07½–	.08
Blanc fixe, dry, bbl.	lb.	.04 –	.04½
Bleaching powder, f.o.b. wks., drums	100 lb.	1.50 –	
Spot N. Y. drums	100 lb.	2.55 –	2.60
Borax, bbl.	lb.	.05½–	.05½
Bromine, cases	lb.	.28 –	.30
Calcium acetate, bags	100 lb.	4.00 –	4.05
Calcium arsenate, dr.	lb.	.11 –	.11½
Calcium carbide, drums	lb.	.05 –	.05½
Calcium chloride, fused, dr. wks.	ton	21.00 –	....
Gran. drums works	ton	27.00 –	....
Calcium phosphate, mono, bbl.	lb.	.06½–	.07
Camphor, cases	lb.	.80 –	.81
Carbon bisulphide, drums	lb.	.06 –	.06½
Carbon tetrachloride, drums	lb.	.09 –	.09½
Chalk, precip.—domestic, light, bbl.	lb.	.04½–	.04¾
Domestic, heavy, bbl.	lb.	.03½–	.04
Imported, light, bbl.	lb.	.04½–	.05
Chlorine, liquid, tanks, wks.	lb.	.04 –	.04½
Contract, tanks, wks.	lb.	.03½–	....
Cylinders, 100 lb., wks.	lb.	.05½–	.06
Cylinders, 106 lb., spot	lb.	.08½–	.09
Chloroform, tech., drums	lb.	.30 –	.32
Cobalt, oxide, bbl.	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks.	ton	16.00 –	18.00
Copper carbonate, bbl.	lb.	.18 –	.19
Copper cyanide, drums	lb.	.47 –	.50
Copper sulphate, dom., bbl.	100 lb.	4.50 –	4.65
Imp bbl.	100 lb.	4.25 –	4.50
Cream of tartar bbl.	lb.	.22½–	.23
Epsom salt, dom., tech., bbl.	100 lb.	1.75 –	2.00
Epsom salt, imp., tech., bags	100 lb.	1.05 –	1.10
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.25 –	2.50
Ether, U.S.P., resale, dr.	lb.	.13 –	.15
Ethyl acetate, 85%, drums	gal.	1.10 –	....
Ethyl acetate, 99%, dr.	gal.	$1.25 –	
Formaldeuyde, 40%, bbl.	lb.	.10½–	$0.11
Fullers earth—f.o.b. mines	ton	18.00 –	20.00
Furfural, works, bbl.	lb.	.25 –	
Fusel oil, ref., drums	gal.	.... –	
Fusel oil, crude, drums	gal.	4.00 –	4.25
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Glaubers salt, imp., bags	100 lb.	.90 –	.95
Glycerine, c.p., drums extra	lb.	.16½–	.17
Glycerine, dynamite, drums	lb.	.15½–	....
Glycerine, crude 80% loose	lb.	.10½–	....
Hexamethylene, drums	lb.	.70 –	.75
Lead:			
White, basic carbonate, dry, casks	lb.	.09½–	....
White, basic sulphate, casks	lb.	.09 –	....
White, in oil, kegs	lb.	.11½–	.11½
Red, dry, casks	lb.	.11½–	.11½
Red, in oil, kegs	lb.	.13½–	.14½
Lead acetate, white crys., bbl.	lb.	.14½–	....
Brown, broken, casks	lb.	.13½–	....
Lead arsenate, powd., bbl.	lb.	.18 –	.20
Lime-Hydrated, bg, wks.	ton	10.50 –	12.50
Bbl., wks.	ton	18.00 –	19.00
Lime, Lump, bbl.	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.10½–	.10½
Lithopone, bags	lb.	.06½–	.06½
in bbl.	lb.	.06½–	.06½
Magnesium carb., tech., bags	lb.	.08½–	.08½
Methanol, 95%, bbl.	gal.	.93 –	....
Methanol, 97%, bbl.	gal.	.95 –	....
Methanol, pure, tanks	gal.	.90 –	....
drums	gal.	1.00 –	....
bbl.	gal.	1.05 –	....
Methyl-acetone, t'ks.	gal.	1.15 –	....
Nickel salt, double, bbl.	lb.	.10 –	.10½
Nickel salts, single, bbl.	lb.	.10½–	.11
Phosgene	....	.60 –	.75
Phosphorus, red, cases	lb.	.70 –	.75
Phosphorus, yellow, cases	lb.	.35 –	.40
Potassium bichromate, casks	lb.	.09½–	....
Potassium bromide, gran., bbl.	lb.	.19 –	.20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½–	.06¾
Potassium chlorate, powd.	lb.	.07½–	.08½
Potassium cyanide, drums	lb.	.47 –	.52
Potassium, first sorts, cask	lb.	.08½–	.08¾
Potassium hydroxide (caustic potash) drums	lb.	.06½–	.06¾
Potassium iodide, cases	lb.	3.65 –	3.75
Potassium nitrate, bbl.	lb.	.07½–	.09
Potassium permanganate, drums	lb.	.14 –	.14½
Potassium prussiate, red, casks	lb.	.45 –	.48
Potassium prussiate, yellow, casks	lb.	.20 –	.20½
Salammoniac, white, gran., casks, imported	lb.	.06½–	....
Salammoniac, white, gran., bbl., domestic	lb.	.07½–	.07½
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl.	100 lb.	1.20	1.40
Salt cake (bulk)	ton	21.00 –	22.00
Soda ash, light, 58% flat, bulk, contract	100 lb.	1.25 –	....
bags, contract	100 lb.	1.38 –	....
Soda ash, dense, bulk, contract, basis 58%	100 lb.	1.35 –	....
bags, contract	100 lb.	1.45 –	....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 –	....
Soda, caustic, ground and flake, contracts, dr.	10 lb.	3.50 –	3.85
Soda, caustic, solid, 76% f. a.s. N. Y.	100 lb.	3.00 –	3.05
Sodium acetate, works, bbl.	lb.	.05½–	....
Sodium bicarbonate, bulk.	100 lb.	1.75 –	....
330-lb. bbl.	100 lb.	2.00 –	....
Sodium bichromate, casks	lb.	.07½–	.07½
Sodium bisulphate (niter cake)	ton	6.00 –	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½–	.04½
Sodium chlorate, kegs	lb.	.06½–	.07
Sodium chloride	long ton	12.00 –	13.00
Sodium cyanide, cases	lb.	.19 –	.22
Sodium fluoride, bbl.	lb.	$0.09 –	$0.10½
Sodium hyposulphite, bbl.	lb.	.02½–	.02½
Sodium nitrite, casks	lb.	.08 –	.08½
Sodium peroxide, powd., cases	lb.	.28 –	.30
Sodium phosphate, dibasic, bbl.	lb.	.03½–	.03½
Sodium prussiate, yel. drums	lb.	.11½–	.11½
Sodium salicylic, drums	lb.	.40 –	.42
Sodium silicate (40°, drums)	100 lb.	.75 –	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 –	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 –	.03½
Sodium sulphite, crys., bbl.	lb.	.03½–	.03¾
Strontium nitrate, powd., bbl.	lb.	.10½–	.11½
Sulphur chloride, yel drums	lb.	.04½–	.05
Sulphur, crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Sulphur, flour, bag	100 lb.	2.25 –	2.35
Sulphur, roll, bag	100 lb.	2.00 –	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 –	.08
Tin bichloride, bbl.	lb.	.13½–	.13¾
Tin oxide, bbl.	lb.	.53 –	
Tin crystals, bbl.	lb.	.34½–	.35
Zinc carbonate, bags	lb.	.14 –	.14½
Zinc chloride, gran, bbl.	lb.	.06½–	.06¾
Zinc cyanide, drums	lb	.37 –	.38
Zinc oxide, , lead free, bag	lb.	.06½–	.06¾
5% lead sulphate bags	lb.	.06½–	.07¼
10 to 35 % lead sulphate, bags	lb.	.06½–	.06¾
French, red seal, bags	lb.	.09½–	.....
French, green seal, bags	lb.	.10½–	.....
French, white seal, bbl.	lb.	.12 –	.....
Zinc sulphate, bbl	100 lb.	2.75 –	3.25

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 –	$0.70
Alpha-naphthol, ref., bbl.	lb.	.65 –	.80
Alpha-naphthylamine, bbl.	lb.	.35 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salts, bbl.	lb.	.22 –	.23
Anthracene, 80%, drums	lb.	.75 –	.80
Anthracene, 80%, imp., drums, duty paid	lb.	.65 –	.70
Anthraquinone, 25%, paste, drums	lb.	.75 –	.80
Benzaldehyde U.S.P., carboys	lb.	1.50 –	.....
f.f.c. drums	lb.	1.60 –	.....
tech, drums	lb.	.70	.....
Benzene, pure, water-white, tanks, works	gal.	.23 –	.....
Benzene, 90%, tanks, works	gal.	.21 –	.....
Benzidine base, bbl.	lb.	.80 –	.84
Benzidine sulphate, bbl.	lb.	.72 –	.75
Benzoic acid, U.S.P., kegs	lb.	.85 –	.88
Benzoate of soda, U.S.P., bbl.	lb.	.65 –	.70
Benzyl chloride, 95-97%, ref., carboys	lb.	.40 –	....
Benzyl chloride, tech., drums	lb.	.25 –	....
Beta-naphthol, tech., bbl.	lb.	.24 –	.25
Beta-naphthylamine, tech.	lb.	.75 –	.80
Cresol, U.S.P., drums	lb.	.25 –	.29
Ortho-cresol, drums	lb.	.28 –	.32
Cresylic acid, 97%, works drums	gal.	.73 –	.75
95-97% drums, works	gal.	.68 –	.70
Dichlorbenzene, drums	lb.	.06 –	.08
Diethylaniline, drums	lb.	.49 –	.51
Dimethylaniline, drums	lb.	.38 –	.39
Dinitrobenzene, bbl.	lb.	.18 –	.20
Dinitrochlorbenzene, bbl.	lb.	.21 –	.22
Dinitronaphthalen, bbl.	lb.	.30 –	.32
Dinitrophenol, bbl.	lb.	.35 –	.40
Dinitrotoluen, bbl.	lb.	.20 –	.22
Dip oil, 25%, drums	gal.	.30 –	.35
Diphenylamine, bbl.	lb.	.50 –	.52
H-acid, bbl.	lb.	.72 –	.75
Meta-phenylenediamine, bbl.	lb.	.95 –	1.00
Michlers ketone, bbl.	lb.	3.00 –	3.50
Monochlorbenzene, drums	lb.	.08 –	.10
Monoethylaniline, drums	lb.	.95 –	1.10
Naphthalene, flake, bbl.	lb.	.06½–	.06½
Naphthalene, balls, bbl.	lb.	.07 –	.07½
Naphthionate of soda, bbl.	lb.	.60 –	.65
Naphthionic acid, crude, bbl.	lb.	.55 –	.60
Nitrobenzene, drums	lb.	.09 –	.09½
Nitro-naphthalene, bbl.	lb.	.30 –	.35
Nitro-toluene, drums	lb.	13½–	.14
N-W acid, bbl.	lb.	1.10 –	1.15
Ortho-amidophenol, kegs	lb.	2.30 –	2.35
Ortho-dichlorbenzene, drums	lb.	.15 –	.17
Ortho-nitrophenol, bbl.	lb.	1.20 –	1.30
Ortho-nitrotoluene, drums	lb.	.11 –	.12
Ortho-toluidine, bbl.	lb.	.14 –	.16
Para-amiñophenol, base, kegs	lb.	1.30 –	.....
Para-amiñophenol, HCl, kegs	lb.	1.55 –	.....
Para-dichlorbenzene, bbl.	lb.	.17 –	.20
Paranitraaniline, bbl.	lb.	.70 –	.72
Para-nitrotoluene, bbl.	lb.	.58 –	.60
Para-phenylenediamine, bbl.	lb.	1.45 –	1.50
Para-toluidine, bbl.	lb.	.88 –	.90
Phthalic anhydride, bbl.	lb.	.30 –	.34
Phenol, U.S.P., dr.	lb.	.26 –	.35
Picric acid, bbl.	lb.	.20 –	.22
Pyridine, dom., drums	gal.	nominal	
Pyridine, imp., drums	gal.	3.50 –	3.75
Resorcinol, tech., kegs	lb.	1.40 –	1.50

Resorcinol, pure, kegs	lb.	$2.15	.....
R-salt, bbl.	lb.	.55	.60
Salicylic acid, tech., bbl.	lb.	.33	.....
Salicylic acid, U.SP., bbl.	lb.	.35	.....
Solvent naphtha, water-white, tanks	gal.	.23	.....
Crude, tanks	gal.	.20	.....
Sulphanilic acid, crude, bbl.	lb.	.18	.20
Thiocarbanilide, kegs	lb.	.35	.38
Tolidine, bbl	lb.	1.00	1.05
Toluidine, mixed, kegs	lb.	.30	.35
Toluene, tank cars, works	gal.	.24	.....
Toluene, drums, works	gal.	.29	.....
Xylidine, drums	lb.	.50	.....
Xylene, pure, tanks	gal.	.40	.43
Xylene, com., tanks	gal.	.27	.29

Naval Stores

Rosin B-D, bbl.	280 lb.	$5.75	.....
Rosin E-I, bbl.	280 lb.	5.80	.....
Rosin K-N, bbl.	280 lb.	6.25	$6.75
Rosin W.G.-W.W., bbl.	280 lb.	7.65	7.85
Wood rosin, bbl.	280 lb.	5.80	5.90
Turpentine, spirits of, bbl.	gal.	1.03	.....
Wood, steam dist., bbl.	gal.	.90	.....
Wood, dest. dist., bbl.	gal.	.75	.....
Pine tar pitch, bbl.	200 lb.	5.50	.....
Tar, kiln burned, bbl.	500 lb.	11.00	.....
Retort tar, bbl.	500 lb.	11.00	.....
Rosin oil, first run, bbl.	gal.	.43	.....
Rosin oil, second run, bbl.	gal.	.47	.....
Rosin oil, third run, bbl.	gal.	.50	.....
Pine oil, steam dist.	gal.	.60	.62
Pine oil, pure, dest. dist.	gal.	.55	.....
Pine tar oil, ref.	gal	.35	.....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.30	.....
Pine tar oil, double ref., bbl.	gal.	.70	.....
Pinewood creosote, ref., bbl.	gal.	.....	.52

Animal Oils and Fats

Degras, bbl.	lb.	$0.04	$0.04½
Grease, yellow, loose	lb.	.06½	.07
Lard oil, Extra No. 1, bbl.	gal.	.85	.....
Neatsfootoil 20 deg. bbl.	gal.	1.33	.....
No. 1, bbl.	gal.	.88	.92
Oleo Stearine	lb.	.10	.....
Olec oil, No. 1, bbl.	lb.	.16	.....
Red oil, distilled, d.p. bbl.	lb.	.09½	.09½
Saponified, bbl.	lb.	.09½	.09½
Tallow, extra, loose	lb.	.08½	.....
Tallow oil, acidless, bbl.	gal.	.86	.....

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.14½	.....
Castor oil, No. 1, bbl.	lb.	.15	.....
Chinawood oil, bbl.	lb.	.20	20½
Coconut oil, Ceylon, bbl.	lb.	.10	.....
Ceylon, tanks, N.Y.	lb.	.08¾	.....
Coconut oil, Cochin, bbl.	lb.	.10½	.10¾
Corn oil, crude, bbl.	lb.	.12	.....
Crude, tanks, (f.o.b. mill)	lb.	.09¾	.10
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.08½	.08¾
Summer yellow, bbl.	lb.	.10½	.11½
Winter yellow, bbl.	lb.	.12½	.12½
Linseed oil, raw, car lots, bbl.	gal.	.91	.....
Raw, tank cars (dom.)	gal.	.85	.....
Boiled, cars, bbl. (dom.)	gal.	.93	.....
Olive oil, denatured, bbl.	gal.	1.10	1.12
Sulphur, (foots) bbl.	lb.	.10½	.10½
Palm, Lagos, casks	lb.	.08	.....
Niger, casks	lb.	.07	.....
Palm kernel, bbl.	lb.	.09½	.....
Peanut oil, crude, tanks (mill)	lb	.12½	.....
Peanut oil, refined, bbl.	lb.	.15	.15½
Per lla, bbl	lb.	.14	.14½
Rapeseed oil, refined, bbl.	gal.	.84	.....
Rapeseed oil, blown, bbl.	gal.	.88	.....
Sesame, bbl.	lb.	.12½	.12½
Soya bean (Manchurian), bbl.	lb.	.12	.....
Tank, f.o.b. Pacific coast	lb.	.10½	.....
Tank, (f.o.b. N.Y.)	lb.	.10	.....

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.68	.....
Menhaden, light pressed, bbl.	gal.	.65	.....
White bleached, bbl.	gal.	.67	.....
Blown, bbl.	gal.	.71	.....
Crude, tanks (f.o.b. factory)	gal.	.47½	.....
Whale No. 1 crude, tanks, coast	lb.	.....	.....
Winter, natural, bbl.	gal.	.75	.76
Winter, bleached, bbl.	gal.	.78	.79

Oil Cake and Meal

Coconut cake, bags	ton	$34.00	.....
Cottonseed meal, f.o.b. mills	ton	45.00	.....
Linseed cake, bags	ton	40.00	.....
Linseed meal, bags	ton	42.00	.....

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.45	$0.50
Albumen, egg, tech, kegs	lb.	.95	.97
Cochneal, bags	lb.	.32	.34
Cutch, Borneo, bales	lb.	.04½	.04¾
Cutch, Rangoon, bales	lb.	.14½	.15
Dextrine, corn, bags	100 lb.	3.69	3.84
Dextrine gum, bags	100 lb.	3.99	4.09
Divi-divi, bags	ton	38.00	39.00
Fustic, sticks	ton	30.00	35.00
Fustic, chips, bags	lb.	.04	.05
Gambier com., bags	lb.	.10½	.11½
Logwood, sticks	ton	25.00	26.00
Logwood, chips, bags	lb.	.02½	.03
Sumac, leaves, Sicily, bags	ton	90.00	.....
Sumac, ground, bags	ton	$85.00	$90.00
Sumac, domestic, bags	ton	40.00	42.00
Starch, corn, bags	100 lb.	3.02	3.12
Tapioca flour, bags	lb.	.06	.07

Extracts

Archil, conc., bbl.	lb.	$0.16½	$0.20
Chestnut, 25% tannin, tanks	lb.	.02	.03
Divi-divi, 25% tannin, bbl.	lb.	.04	.05
Fustic, crystals, bbl.	lb.	.20	.22
Fustic, liquid, 42°, bbl.	lb.	.08	.09
Gambier, liq., 25% tannin, bbl.	lb.	.09½	.09¾
Hematine crys., bbl.	lb.	.14	.18
Hemlock, 25% tannin, bbl.	lb.	.03½	.04
Hypernic, solid, drums	lb.	.24	.26
Hypernic, liquid, 51°, bbl.	lb.	.09½	.10½
Logwood, crys., bbl.	lb.	.14	.15
Logwood, liq., 51°, bbl.	lb.	.08	.09
Quebracho, solid, 65% tannin, bbl.	lb.	.05	.05½
Sumac, dom., 51°, bbl.	lb.	.06½	.07½

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, contract	lb.	$0.06½	$0.08½
spot, cases	lb.	.10	.14
Lampblack, bbl.	lb.	.12	.40
Mineral, bulk	ton	35.00	45.00
Blues–Bronze, bbl.	lb.	.40	.43
Prussian, bbl.	lb.	.40	.43
Ultramarine, bbl.	lb.	.08	.35
Browns, Sienna, Ital., bbl.	lb.	.06	.14
Sienna, Domestic, bbl.	lb.	.03½	.04
Umber, Turkey, bbl.	lb.	.04	.04½
Greens–Chrome, C.P. Light, bbl	lb.	.28	.30
Chrome, commercial, bbl.	lb.	.12	.12½
Paris, bulk	lb.	.26	.28
Reds, Carmine No. 40, tins	lb.	4.50	4.70
Iron oxide red, casks	lb.	.10	.16
Para toner, kegs	lb.	1.00	1.10
Vermilion, English, bbl.	lb.	1.15	1.20
Yellow, Chrome, C.P. bbls.	lb.	.17	.17½
Ocher, French, casks	lb.	.02½	.03

Waxes

Bayberry, bbl.	lb.	$0.25	$0.26
Beeswax, crude, Afr. bg.	lb.	.21½	.22
Beeswax, refined, light, bags	lb.	.32	.34
Beeswax, pure white, cases	lb.	.40	.41
Candelilla, bags	lb.	.23	.23½
Carnauba, No. 1, bags	lb.	.36	.38
No. 2, North Country, bags	lb.	.21	.21½
No. 3, North Country, bags	lb.	.18½	.19
Japan, cases	lb.	.18	.18½
Montan, crude, bags	lb.	.05½	.06
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.04½	.....
Crude, scale 124-126 m.p. bags	lb.	.03½	.03¾
Ref., 118-120 m.p., bags	lb.	.04	.....
Ref., 125 m.p., bags	lb.	.05	.....
Ref. 128-130 m.p., bags	lb.	.04½	.....
Ref., 133-135 m.p., bags	lb.	.05	.05½
Ref., 135-137 m.p., bags	lb.	.05½	.....
Stearic acid, agle pressed, bags	lb.	.11½	.11¾
Double pressed, bags	lb.	.12	.12½
Triple pressed, bags	lb.	.13	.13½

Fertilizers

Acid phosphate, 16%, bulk, works	ton	$8.00	$8.25
Ammonium sulphate, bulk f.o.b. works	100 lb.	2.90	.....
Blood, dried, bulk	unit	4.10	4.15
Bone, raw, 3 and 50, ground	ton	26.00	28.00
Fish scrap, dom., dried, wks.	unit	.....	.....
Nitrate of soda, bags	100 lb.	2.42	2.45
Tankage, high grade, f.o.b. Chicago	unit	3.25	3.35
Phosphate rock, f.o.b. mines Florida pebble, 68-72%	ton	4.00	4.50
Tennessee, 78-80%	ton	7.75	8.00
Potassium muriate, 80%, bags	ton	34.55	.....
Potassium sulphate, bags basis 90%	ton	45.85	.....
Double manure salt	ton	27.00	.....
Kainit	ton	7.22	.....

Crude Rubber

Para—Upriver fine	lb.	$0.22	.....
Upriver coarse	lb.	.17½	.....
Upriver caucho ball	lb.	.19½	.....
Plantation—First latex crepe	lb.	.25½	.....
Ribbed smoked sheets	lb.	.25	.....
Brown crepe, thin, clean	lb.	.23½	.....
Amber crepe No. 1	lb.	.24½	.....

Gums

Copal, Congo, amber, bags	lb.	$0.10	$0.15
East Indian, bold, bags	lb.	.20	.21
Manila, pale, bags	lb.	.19	.20
Pontinak, No. 1 bags	lb.	.19	.20
Damar, Batavia, cases	lb.	.24½	.25
Singapore, No. 1, cases	lb.	.32	.33
Singapore, No. 2, cases	lb.	.21½	.22
Kauri, No. 1, cases	lb	.64	.66
Ordinary chips, cases	lb.	.20½	.21½
Manjak, Barbados, bags	lb.	.09	.14

Shellac

Shellac, orange fine, bags	lb.	$0.60	$0.61
Orange superfine, bags	lb.	.62	.63
A. C. garnet, bags	lb.	.58	.59
Bleached, bonedry	lb.	.69	.70
Bleached, fresh	lb.	.56	.57
T. N., bags	lb.	.58	.59

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh. ton	$325.00	$450.00
Asbestos, shingle, f.o.b., Quebec	sh. ton	50.00	70.00
Asbestos, cement, f.o.b., Quebec	sh ton	17.00	20.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	16.00	17.00
Barytes, grd., off-color, f.o.b. Balt.	net ton	13.00	14.00
Barytes, floated, f.o.b. St. Louis, bbl.	net ton	23.00	26.00
Barytes, crude f.o.b. mines, bulk	net ton	8.50	10.00
Casein, bbl., tech.	lb.	12	.12½
China clay (kaolin) crude, No. 1, f.o.b. Ga.	net ton	8.50	10.00
Washed, f.o.b. Ga.	net ton	8.00	9.00
Powd., f.o.b. Ga.	net ton	13.00	20.00
Crude f.o.b. Va.	net ton	6.00	8.00
Ground, f.o.b. Va.	net ton	13.00	19 00
Imp., lump, bulk	net ton	15.00	20 00
Imp., powd.	net ton	45 00	50 00
Feldspar, No. 1 f.o.b.N.C.	long ton	6 60	7.75
No. 2 f.o.b.N.C.	long ton	4.50	5.00
No. 1 soap	long ton	8.50	.....
No. 1 Canadian, f.o.b. mill, powd.	long ton	20.00	.....
Graphite, Ceylon, lump, first quality, bbl.	lb.	.05½	06
Ceylon, chip, bbl.	lb.	.04½	.05
High grade amorphous crude	ton	15.00	35.00
Gum arabic, amber, sorts, bags	lb.	.11½	.12
Gum tragacanth, sorts, bags	lb.	.50	.55
No. 1, bags	lb.	1.35	1.40
Kieselguhr, f.o.b. Cal.	ton	40.00	42.00
F.o.b. N. Y.	ton	50.00	55.00
Magnesite, crude, f.o.b. Cal.	ton	14.00	15.00
Pumice stone, imp., casks	lb.	.03	.05½
Dom., lump, bbl.	lb.	.05	.05½
Dom., ground, bbl.	lb.	.05½	.06
Silica, glass sand, f.o.b. Ind.	ton	2.00	2.50
Silica, sand blast, f.o.b. Ind.	ton	2.25	3.50
Silica, amorphous, 200-mesh, f.o.b. Ill.	ton	20.00	.....
Silica, glass sand, f.o.b. Ill.	ton	1.75	3.00
Soapstone, coarse, f.o.b. Vt., bags	ton	7.00	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra	ton	8.00	8.50
Talc, 200 mesh, f.o.b. Ga., bags	ton	8.00	9.00
Talc, 350 mesh, f.o.b. New York, grade A bags	ton	22.00	.....

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$4.00	$4.50
Corning	bbl.	2.10	.....
Cabell	bbl.	2.05	.....
Somerset	bbl.	2.15	2.35
Illinois	bbl.	1.72	.....
Indiana	bbl.	1.73	.....
Kansas and Okla. under 33 deg.	bbl.	1.15	.....
California, 35 deg. and up	bbl.	1.01	.....

Gasoline, Etc.

Motor gasoline, steel bbls.	gal.	$0.20	.....
Naphtha, V. M. & P. deod, steel bbls	gal	.19	.....
Kerosene, ref. tank wagon	gal.	.15	.....
Bulk, W.W. delivered, N.Y.	gal.	.09	.....
Lubricating oils:			
Cylinder, Penn., dark	gal.	.26	.....
Bloomless, 30@31 grav.	gal.	.18	.....
Paraffin, pale	gal.	.16½	.17
Spindle, 200, pale	gal.	.21	.21½
Petrolatum, amber, bbls.	lb.	.03½	.04½
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,00	$140-145
Chrome brick, f.o.b. Eastern shipping points	ton	45-47
Chrome cement, 40-50% Cr_2O_3	ton	23-27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	42-45
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	35-38
Magnesite brick, 9-in. straight (f.o.b wks.)	ton	65-68
9-in. arches, wedges and keys	ton	80-85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	50-53
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	50-53
F.o.b. Mt. Union, Pa.	1,000	42-45
Silicon carbide refract. brick, 9-in.	1,000	1180.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y.	ton	$200.00	.....

Ferrochromium, per lb. of Cr, 1-2% C	lb.	$0.30 –	.....
4-6% C	lb.	.10½–	.....
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	109.00 –	.....
Spiegeleisen, 19-21% Mn	gr. ton	38.00 –	40.00
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 –	2.50
Ferrosilicon, 10-12%	gr. ton	41.50 –	46.50
50%	gr. ton	75.00 –	.....
Ferrotungsten, 70-80%, per lb. of W	lb.	.85 –	.90
Ferro-uranium, 35-50% of U per lb. of U	lb.	4.50 –	.....
Ferrovanadium, 30-40% per lb. of V	lb.	3.50 –	4.00

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$5.50 –	$8.75
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3.	ton	22.00 –	23.00
C.i.f. Atlantic seaboard	ton	19.50 –	22.00
Coke, fdry., f.o.b. ovens	ton	5.00 –	5.50
Coke, furnace, f.o.b. ovens	ton	3.75 –	4.00
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50 –	.....
Ilmenite, 52% TiO_2 Va.	lb.	.01½–	.....
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.42 –	.46
Manganese ore, chemica (MnO_2)	ton	7.00 –	80.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.80 –	.....
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 –	.08
Pyrites, Span., fines, c.i.f Atl. seaport	unit	.11½–	.12
Pyrites, Span., furnace size c.i.f. Atl. seaport	unit	.11½–	.12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 –	.....
Rutile, 95% TiO_2	lb.	.12 –	.15
Tungsten, scheelite, 60% WO_3 and over	unit	9.50 –	10.00
Tungsten, wolframite, 60% WO_3	unit	9.00 –	.....
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 –	3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	12.25 –	2.50
Vanadium pentoxide, 99%	lb.	2.00 –	14.00
Vanadium ore, per lb. V_2O_5	lb.	1.00 –	1.25
Zircon	ton	50.00 –	.....

Non-Ferrous Metals

Copper, electrolytic	lb.	$0.12½–$0.12¾
Aluminum, 98 to 99%	lb.	.27½– .28½
Antimony, wholesale, Chinese and Japanese	lb.	.10½– .....
Nickel, 99%	lb.	.26 – .30
Monel metal, shot and blocks	lb.	.32
Monel metal, ingots	lb.	.38
Monel metal, sheet bars	lb.	.45
Tin, 5-ton lots, Straits	lb.	.49½
Lead, New York, spot	lb.	.08
Lead, E. St. Louis, spot	lb.	.08
Zinc, spot, New York	lb.	.06825
Zinc, spot, E. St. Louis	lb.	.06475
Silver (commercial)	oz.	.63½
Cadmium	lb.	.70–.75
Bismuth (500 lb. lots)	lb.	2.30
Cobalt	lb.	3.00-3.25
Magnesium, ingots, 99%	lb.	.90–.95
Platinum	oz.	122.00
Iridium	oz.	275.00-300.00
Palladium	oz.	83.00
Mercury	75 lb.	58.00-60.00
Tungsten	lb	.90–.95

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	19.50
Copper bottoms	29.50
Copper rods	20 00
High brass wire	18.00
High brass rods	15.50
Low brass wire	20.00
Low brass rods	20.50
Brazed brass tubing	23.50
Brazed bronze tubing	25.00
Seamless copper tubing	23.50
Seamless high brass tubing	22.00

OLD METALS—The following are the dealers purchasing prices in cents per pound:

Copper, heavy and crucible	10.00 @ 10.25
Copper, heavy and wire	9.87½@ 10.00
Copper, light and bottoms	8.00 @ 8.25
Lead, heavy	6.62½@ 6.87½
Lead, tea	3.62½@ 3 87½
Brass, heavy	5.25 @ 5.50
Brass, light	4.50 @ 4.75
No. 1 yellow brass turnings	5.00 @ 5.12½
Zinc scrap	3.75 @ 4.00

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.54	$3.54
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.39	4.39
Plates, ¼ to 1 in. thick	3.64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Alabama

PAINT ROCK—The local plant and property of the National Basic Fertilizer Co. have been acquired by new interests, headed by Dr. Elgin, Tuscaloosa, Ala. The company will be reorganized. Plans are said to be under consideration for extensions and improvements in the plant.

Arkansas

LITTLE ROCK—The Arkansas Bauxite Products Co., 313 Donaghey Bldg., is perfecting plans for the construction of a new plant on property leased on the line of the Rock Island R.R., with estimated deposit of more than 200,000 tons of bauxite. The works will be given over to the production of alum, and will be equipped for an initial output of about 50 tons per day; it is estimated to cost approximately $35,000. C. D. Hyten heads the company.

LITTLE ROCK—B. F. Reeves, Little Rock, and associates are organizing a company to construct and operate a carbon black plant, on site said to have been selected in the vicinity of Monroe. It will be of four-unit type and is estimated to cost approximately $300,000, with equipment. Permission for the project has been secured from the state railroad commission. John F. Streepy, attorney, Little Rock, represents the new organization.

EL DORADO—The Lion Oil & Refining Co. has tentative plans under advisement for the rebuilding of the portion of its local plant, destroyed by fire, Jan. 17, with loss estimated at $50,000.

California

SAN FRANCISCO—The Western Sugar Refinery, 2 Pine St., has construction in progress on a new char house at its plant at Louisiana and 23rd Sts., and will have the structure ready for service at an early date. Other extensions and betterments are also being made at the plant, including the installation of additional equipment, with total cost estimated in excess of $1,000,000. A large warehouse has been constructed, equipped with latest type labor-saving equipment. The work has been carried out during the annual shut-down period, and production will soon be resumed.

LONG BEACH—The Pacific Coast Steel Co., represented by T. T. C. Gregory, Insurance Exchange Bldg., San Francisco, has secured permission from the War Department to proceed with the construction of its proposed steel plant on local site in the harbor section, recently acquired. The plant will consist of a number of units, with large blast furnaces and steel mills, and is estimated to cost in excess of $20,000,000, including machinery and operating equipment.

Florida

KELSEY CITY—The Royal Palm Rubber Co. has awarded a contract to E. H. Barto, Kelsey City, for the erection of a new local plant for the manufacture of automobile tires and tubes, estimated to cost close to $50,000, with initial equipment. Work will be placed in progress at once. G. F. Laughlin is president.

DAYTONA—The Daytona Public Service Co., operated by the Massachusetts Lighting Co., 77 Franklin St., Boston, Mass., is reported to be planning for extensions and improvements in its artificial gas plant, to include the construction of a new gas reservoir with capacity of about 1,000,000 cu.ft.

Georgia

QUITMAN—The Oaks Farm has tentative plans under advisement for the installation of a dehydrating plant for green foods. The company is desirous of getting into contact with manufacturers of equipment of this character.

Illinois

CHICAGO—The Chicago Pottery Co., 1924 Clyburn Ave., has awarded a general contract for the erection of its proposed plant addition at 1920-22 Clyburn Ave., and will commence work at once. It will be 4-story, estimated to cost close to $150,000. F. J. Clifford is president.

CHICAGO—The Sherwin-Williams Co., 601 Canal Rd., N. W., Cleveland, O., has leased space in a building in the Central Manufacturing District project, known as Unit B, totaling about 40,000 sq.ft. of space, for a local factory branch, for distributing and production service. Occupancy has been arranged for Feb. 1.

Kentucky

LOUISVILLE—The Standard Sanitary Mfg. Co., Bessemer Bldg., Pittsburgh, Pa., manufacturer of enameled iron sanitary ware, etc., is completing plans and will soon take bids for the erection of the proposed addition to its local plant at Shipp and 6th Sts., to be 4-story and basement, 165x450 ft., estimated to cost in excess of $1,000,000, with equipment. Joseph & Joseph, Francis Bldg., Louisville, are architects.

Louisiana

MARRERO—The Celotex Co., manufacturer of composition board products from bagasse, is arranging an expansion program for the next 24 to 36 months, to include extensions in the local mill, as well as proposed branch plants in Cuba, Hawaii and other points, estimated to involve more than $20,000,000. The company is now completing an addition to its local plant, representing an investment of about $1,000,000, and will soon place the unit in service. B. G. Dahlberg is president, and C. F. Dahlberg vice-president in charge of operations at the Marrero mill.

MONROE—The Brown Paper Mill Co., Orange, Tex., is proceeding with the erection of its local mill, and has awarded a contract for another building to the Morton C. Tuttle Co., Park Sq. Bldg., Boston, Mass., on which work will be commenced at once. It is expected to place the plant in operation in the near future.

Missouri

WEBB CITY—C. D. Boynton, Webb City, is at the head of a project to construct a local plant for the production of asphalt mixtures for road building and other service, using mining waste as raw material. The initial works are expected to cost close to $30,000. It is purposed to organize a company to operate the plant.

ST. LOUIS—The Steelcote Mfg. Co., 700 North Main St., manufacturer of special paints and coatings, has plans under way and will take bids early in February, for the erection of a new 4-story plant, 60x100 ft., on Theresa Ave., estimated to cost about $55,000, including equipment. Hellmuth & Hellmuth, De Menil Bldg., are architects. G. E. Niedt is president and treasurer.

New Jersey

ELIZABETH—The Magnum Rubber Products Co., Garfield, N. J., has acquired the former local plant on Newark Ave., of the Stanwood Rubber Co., now defunct. The new owner will take immediate possession, and will equip the structure for the manufacture of tires and other rubber products.

CAMDEN—The C. A. Reynolds Leather Co., Walnut St., is having plans drawn and will soon call for bids for a new 1-story tanning plant, 50x100 ft., on Walnut St., estimated to cost about $35,000. Lackey & Hettle, 5 Hudson St., are architects.

TRENTON—The Thomas Maddock's Sons Co., Perry and Ewing Sts., has commissioned W. E. S. Dyer, Land Title Bldg., Philadelphia, Pa., architect and engineer, to prepare plans for its proposed new plant for the manufacture of all-clay sanitary ware, on site recently purchased at Hamilton Township, near Trenton. It will consist of a number of units to total 450x1,600 ft., with estimated cost placed in excess of $750,000, with equipment. The present pottery will be removed to the new location. A. M. Maddock is president.

ELIZABETH—Fire, Jan. 22, destroyed a portion of the plant of the Superior Novelty Mfg. Co., 1124 East Jersey St., manufacturer of celluloid and fiber products, with loss estimated at $150,000, including equipment. It is planned to rebuild. The works are located in Linden Township.

New York

NEW YORK—The Roelly Chemical Co., 72 Grand St., has leased a floor in the building at 243 West 17th St., totaling about 10,000 sq.ft., for a new works.

Ohio

MINERAL CITY—The Hickory Mining Co., Finance Bldg., Cleveland, O., has plans under way for the construction of a new plant on site about 3 miles from Mineral City, for the manufacture of firebrick and other refractory products. It will consist of a main 1- and 2-story building, with power house, estimated to cost about $75,000. Floyd W. Miller is president.

Oklahoma

OKMULGEE—The Allied Refining Co. is planning for enlargements in its local refining plant, to include the erection of a new 1-story unit for the manufacture of lubricating oils, estimated to cost $130,000, with machinery. It is purposed to bring the plant capacity to about 2,500 bbl. per day. W. P. Henry is head.

KUSA—The Kusa Brick & Tile Co. has plans under way for extensions in its plant to double, approximately, the present capacity. Considerable additional equipment will be installed. George A. Nicholson is president.

Pennsylvania

KINGSTON—The Barrett Mfg. Co. has extensions under way at its local paper mill, and will make improvements in a number of departments, with the installation of additional equipment. The power house is also being improved.

ZELINOPLE—The Iron City Sanitary Mfg. Co., Oliver Bldg., Pittsburgh, Pa., manufacturer of sanitary ware, will soon break ground for the erection of an addition to its local plant, to be 1-story, 90x360 ft., estimated to cost close to $90,000, with equipment. C. A. Fagin is president.

GREEN HILL—The E. H. Jacobs Co., Green Hill, near West Chester, manufacturer of fire-extinguishing compounds, etc., has acquired the plant and business of the Hanks Co., Hagerstown, Md., manufacturer of a kindred line of products, and will remove the equipment to its local works. The plant will be enlarged and improved for considerable increase in output.

PITTSBURGH—Fire, Jan. 21, destroyed a portion of the local plant of the Atlantic Refining Co., manufacturer of refined oils, with loss estimated at $45,000, including tanks and other equipment. It is planned to rebuild.

HUNTINGDON—The Federal Refractories Co., Rockefeller Bldg., Cleveland, O., has entered into an agreement with the Pennsylvania state officials to install and operate a plant for the production of ganister rock in Huntingdon county on a percentage basis. Work will be commenced at an early date.

South Carolina

GREENWOOD—The local plant and business of the Evans Oil & Fertilizer Co. have been acquired by J. S. Bafley and associates. The new owners plan to reorganize the company and expand the plant.

EASLEY—The East Easley Supply Co., P. O. Box 101, recently organized, has awarded a general contract to James Hendricks, Easley, for the construction of the first unit of its proposed local plant for the manufacture of commercial fertilizers, on which work will be commenced at once. A list of equipment to be installed will soon be arranged. J. G. Coly heads the company.

South Dakota

BELLE FOURCHE—The Holly Sugar Corp., Kittredge Bldg., Denver, Colo., is reported to be considering plans for the construction of a local sugar-refining plant, to consist of a number of buildings, with power house, estimated to cost in excess of $750,000, including equipment.

Tennessee

KNOXVILLE—The Tennessee Roofing Tile Co., heretofore known as the Knoxville Roof, Tile & Concrete Co., has plans under way for the establishment of a new plant at Memphis, Tenn., for the manufacture of concrete composition roofing tile, and will take bids early in February. A similar plant is also projected at Chattanooga, Tenn. The company has recently increased its capital for expansion. M. M. Copenhaver is president.

MEMPHIS—The Commercial Chemical Co. has tentative plans in preparation for an addition to its plant to be used primarily for the production of arsenic acid. It will be of two-unit type, estimated to cost approximately $80,000, with equipment. W. D. Cannon is president.

Texas

CROSS PLAINS—Thomas Bryant, a member of the firm of Crabb, McNeal & Bryant, local oil operators, is at the head of a project to construct and operate a gasoline-refining plant, using crude oil from the Pioneer and Cross Cut fields. A site has been selected. The initial unit is estimated to cost about $75,000.

HASKELL—The Western Cotton Oil Co. has plans nearing completion for the erection of a local plant for the manufacture of cottonseed oil products. It will consist of a number of buildings, with main unit to be 1-story, 50x150 ft. A power house will also be built. It is expected to call for equipment bids early in February, including 50-ton capacity cooker, hydraulic presses, crushing machine with feeder, mote machine, hullers and separating units, attrition mill, cake stripper and other apparatus. Earl Cogdell is manager.

To Readers of the Industrial Section

Is this section of interest to you? A revision of the service is planned that will mean the elimination of these departments from the paper, and distribution by mail to those who find it of value.

If you wish to be included in such a distribution, write to the Industrial Editor, *Chemical & Metallurgical Engineering*, Tenth Ave. at 36th St., New York City, and specify the headings that you want.

COLORADO—The Continental Cotton Oil Co. has authorized plans for the rebuilding of the portion of its local plant, recently destroyed by fire, and work will soon be commenced. New machinery will be installed. A power house will also be constructed. John Guitar, Abilene, Tex., heads the company.

West Virginia

CLARKSBURG—The Lafayette Glass Co., operating at Northview, near Clarksburg, has plans for extensions and improvements in its plant for considerable increase in capacity. Additional blowing machines and other equipment will be installed. The company has recently increased its capital from $150,000 to $250,000, for expansion.

New Companies

ANILINE COLOR & CHEMICAL CO., 162 West Kinzie St., Chicago, Ill.; chemicals, dyes, etc.; $25,000. Incorporators: J. Philip Bauer, A. G. Dicus and J. B. Jones.

BEACON PAINT PRODUCTS CO., Boston, Mass.; paints, varnishes, oils; $10,000. Paul Aronson, president; and Samuel Waldstein, 1 Maple St., Roxbury, Mass., treasurer.

PASSAIC GLASS CO., Passaic, N. J.; glass products; $100,000. Incorporators: Leonard Troast and Charles Elias, 812 Main Ave., Passaic. The last noted is representative.

EUREKA CHEMICAL CO., Sylacuga, Ala.; chemicals and chemical byproducts; organized. P. L. Mosley and J. D. Ratchford, both of Sylacuga, head the company.

W. E. MILLER CORP., Yonkers, N. Y.; petroleum products; $25,000. Incorporators: C. F. Bailey, W. S. Sawyer and S. C. Worthen. Representatives: Elkus & Gleason, 111 Broadway, New York.

AMERICAN RUBBER PRODUCTS CO., Hamtramck, Mich.; rubber goods of all kinds; $100,000. Incorporators: William H. Stafford, and Nels L. Olson, 246 Massachusetts Ave., Hamtramck.

KENDALL MFG. CO., Providence, R. I.; soaps, washing powders, etc.; $500,000. Incorporators: Paul L. Butler, Cambridge, Mass.; Gordon R. Fulton, West Newton, Mass.; and O. V. Kean, Providence.

J. M. NURRE GLASS CO., Bloomington, Ind.; glass products, mirrors, etc.; $50,000. Incorporators: Joseph M. Nurre and W. Edward Showers, both of Bloomington.

ZILLESSEN & SON, INC., Passaic, N. J.; chemicals and chemical byproducts; $50,000. Incorporators: E. A. and Ernest J. Zillessen, 353 Van Houten St., Passaic. The last noted is representative.

EVERLAST PAINT PRODUCTS CORP., New York, N. Y.; paints and varnishes; $10,000. Incorporators: C. T. Culver, L. Straus and A. R. Sherick. Representative: L. M. White, 7 Beekman St., New York.

CUMMINGS CHEMICAL CO., INC., Winston-Salem, N. C.; chemicals and chemical byproducts; $125,000. Incorporators: J. H. Dyer, and L. W. Cummings, poth of Winston-Salem.

TIDEWATER LEATHER CO., Salem, Mass.; leather tannery; $125,000. George P. Drury is president; and Irving W. Skilton, 15 Linnaean St., Cambridge, Mass., treasurer.

NATIVE PETROLEUM CORP., Los Angeles, Calif.; refined petroleum products; $100,000. Incorporators: John Dietzel, Joseph and Albert Ferrero. Representative: A. S. Goldfiam, 511 Charles C. Chapman Bldg., Los Angeles.

MOLDING PRODUCTS CORP., Boonton, N. J.; chemicals and chemical byproducts; 200 shares of stock, no par value. Incorporators: F. T. White and Edward T. Kelly, Boonton. The last noted is representative.

NEW YORK & PENNSYLVANIA CLAY PRODUCTS CO., Ridgway, Pa.; tile and other burned clay products; $10,000. H. T. Mann, Bellefonte, Pa., is treasurer.

GOLD SEAL CHEMICAL CORP., New York, N. Y.; chemical specialties; $70,000. Incorporators: M. H. Matthews, A. Wanderling and S. R. Usso. Representative: J. J. Pentell, 291 Broadway, New York.

UNITED PAINT & VARNISH CO., INC., Worcester, Mass.; paints, oils, varnishes, etc.; $50,000. Sylvester J. Kett is president; and Anna E. McGrady, 8 Woodland St., Worcester, treasurer.

LOBITOS OIL CO., San Francisco, Calif.; petroleum products; $300,000. Incorporators: D. R. Getchell, R. D. Clark and T. W. Maurice. Representative: E. C. Easton, attorney, San Francisco.

VELVET SOAP PRODUCTS, INC., Camden, N. J.; soaps and washing powders; $50,000. Incorporators: William J. Van Meter, Charles L. Fossen and John J. Garvin. Representative: Charles A. Cogan, 505 Federal Street, Camden.

FRANK W. HORNER, INC., Lynn, Mass.; chemicals and affiliated products; $50,000. Daniel F. Collins is president, and Elsa V Johnson, Winchester, Mass., treasurer.

JANUARY OIL CORP., Olean, N. Y.; petroleum and byproducts; $250,000. Incorporators: A. E. Yahn, I. W. Miller and B. M. Sullivan. Representative: J. P. Quigley, attorney, Olean.

REFRACTORIES PROCESS CORP., New York, care of the United States Corporation Co., 65 Cedar St., New York, representative; refractory products, firebrick, etc.; $5,500,000.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

CHEMICALS. Bordeaux, France. Agency —8995.

CHEMICALS, industrial. Athens, Greece. Agency.—8973.

FERTILIZER and fertilizer materials. Charlottetown, Canada. Purchase.—8999.

GLUE, fish. Danzig. Purchase.—8952.

INDIGO BLUE. Port au Prince, Haiti. Agency.—9000.

MANGANESE PEROXIDE from Montana. Rotterdam, Netherlands. Purchase and agency.—8996.

PAINTS AND VARNISHES. Lucca, Italy. Agency.—8942.

SODA AND POTASH, prussiates and bichromates of. Barcelona, Spain. Agency. —8974.

DEXTRINE, corn and potato. Christiania, Norway. Agency.—8948.

LUBRICATING AND CRUDE OILS. Reval, Esthonia. Agency.—8944.

LUBRICATING OILS AND PARAFFIN. Lucca, Italy. Agency.—8942.

MINERAL OILS. Barcelona, Spain. Agency.—8974.